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IT TAKES TWO TO TANGO - An inquiry into healthcare professional education environments

Per J. Palmgren

Karolinska Institutet

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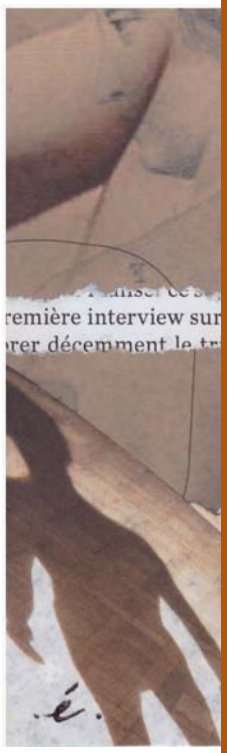

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“Education is the most powerful weapon which you can use to change the world”

– Nelson Mandela

ABSTRACT

Investigations into healthcare professional education environments have been increasingly acknowledged and it is widely recognized that the environment is an important determinant of educational outcomes and educational stakeholders' behavior and sense of well-being. However, the phenomenon of the educational environment constitutes a somewhat vague construct with a multitude of connotations, and exploring the environment can be intricate because of the various settings in healthcare professional education. Moreover, some professional groups have been investigated less than others, and there is a scarcity of perspectives from specific stakeholders. The overall aim of this thesis was to provide a deeper understanding of the phenomenon of the educational environment in healthcare professional education. More specifically, to explore what constitutes educational environments and what it means in the context of chiropractic and physiotherapy undergraduate education from the perspective of students and teachers. A mixed methods multiple case study approach with a multi-lens focus anchored in a pragmatic stance was embraced, thus employing quantitative descriptive surveys using a well-established instrument, the Dundee Ready Educational Environment Measure (DREEM), and a psychometric investigation using a non-parametric approach of item response theory. In-depth qualitative explorations using focus groups with students and semi-structured individual interviews with teachers was also executed. In *Studies I* and *II*, students' perceptions of the environment were introspected. *Study I* revealed that physiotherapy students perceived a very good overall environment. Students in terms 1 and 2 were most positive and term 4 most negative. Two DREEM items stood out: *teaching overemphasizing factual learning* and *authoritarian teachers*. In *Study II*, chiropractic students perceived an excellent overall environment at two time points (2009 and 2012). Year 1 students were most positive at both time points, and years 3 and 4 students were most negative in 2009 and 2012, respectively. Students' perceptions about teachers decreased between the two time points. Three DREEM items stood out in 2009, 2012, and also in a longitudinal sample of students: *teaching overemphasizing factual learning, authoritarian teachers,* and *limited support for stressed students.* There were tendencies of a more positive perception about different aspects of the environment among the longitudinally surveyed students. *Study III* examined the DREEM's psychometric properties. The findings could not support the a priori subscale construction of the instrument (subpar scalability coefficients), and reversely worded items proved most problematic. *Study IV* explored chiropractic students' experiences of the meaning of their educational environment. The findings indicated a sense of a changing environment, with five themes emerging: *Being part of a community; Scaffolding relationships; Personal growth; A place of meaningfulness,* and *Trust in a regulated system*. *Study V* explored and contrasted chiropractic and physiotherapy teachers' experiences and conceptualizations of the meaning of the educational environment. Contextual differences were uncovered between the two groups of teachers as well as five communal conceptualizations of the educational environment: *Physical, Organizational, Relational, Communicational,* and *Pedagogical*.

Conclusively, this thesis argues that the educational environment is not an all-encompassing, solitary, and static phenomenon but, rather, a more complex, less fixed and measurable phenomenon than previously thought – a multilayered and multidimensional phenomenon in a relentless state of flux and a product of the contextual climate and culture.

PROLOGUE

The title of this thesis connotes a popular dance metaphor "It takes two to tango," an idiomatic expression which suggests something in which more than one entity are paired in an inextricably-related and active manner. The tango is a dance which requires two partners moving in relation to each other, sometimes in tandem, sometimes in opposition, sometimes moving forward than backwards, occasionally in linear paths occasionally in circular paths. This metaphor can be assigned to many dual aspects of this project, such as the populations of interest, the study participants, and the methods employed. Moreover, the metaphor can be used to represent my own journey. Setting out with a background as a dancer, I became a curious student of chiropractic with an aim to learn about the body and an intent to help people with diverse musculoskeletal problems. But just like in dancing, you can never predict whether your partner will follow your lead – I was drawn to another path. Upon graduation, I was immediately and perilously drawn into teaching – with its "coup de foudre" – and I fell thoroughly in love with my role as a teacher. I began to think about the "dance" of knowledge, skills, and attitudes between me and my students, and I began to wonder about my students' learning and whether my teaching and the micro-environment I was trying to create in the classroom made any difference to them. Thus, I pursued a master's degree in medical education and entered the fascinating world of educational vocabulary, theories, and research. This became the stepping stone into the current research project, which coincided with a proposal from the Swedish Higher Education Authority and the Swedish Council for Higher Education (2010) that chiropractic education should become a state university program in the form of specialist training after undergraduate training as a registered physiotherapist. Thus, the proposal to merge these two professions raised questions in my mind concerning reciprocities and coherencies, especially regarding the environment within which education is delivered to these specific vocational groups, thus providing the initial impetus for the thesis. With this pre-understanding, I started my journey as a PhD student, and my initial idea was to compare and contrast these two educational contexts using a pre-post design. However, even though the government had indicated its intention, political and educational reforms are lengthy processes, and formal decisions are yet to be taken. Thus, the project set out on a new direction with an intention to gain a deeper understanding of the educational environment and what it means to the actual context – similar to learning to dance the tango in two different environments: on the streets of Bueno Aires or in ballrooms in London.

My journey from chiropractor to teacher, and now researcher, has been long, non-linear, and fascinating. The question I return to again and again is what constitutes the educational environment and what it means to different stakeholders in their day to day activities. There is general consensus that the environment impacts on education. However, the details of how and in what way are more complicated. This thesis thus focuses on environments in healthcare professional education, with a special emphasis on two groups of healthcare professionals, chiropractic and physiotherapy. The unit of analysis is the educational environment, and I attempt to contribute food for thought and shed light on this multifaceted concept.

LIST OF SCIENTIFIC PAPERS

This thesis is based on the following papers, which will be referred to by their Roman numerals.

I. **Palmgren PJ**, Lindquist I, Sundberg T, Nilsson GH and Bolander Laksov K.
Exploring perceptions of the educational environment among undergraduate physiotherapy students.
International Journal of Medical Education. 2014;5:135-146

II. **Palmgren PJ**, Sundberg T and Bolander Laksov K.
Reassessing the educational environment among undergraduate students in a chiropractic training institution – A study over time.
Journal of Chiropractic Education. 2015;29:110-126

III. **Palmgren PJ**, Brodin U, Nilsson GH, Watson R and Bolander Laksov K.
The psychometric properties and dimensional structure of the Dundee Ready Educational Environment Measure – A Mokken Scale Analysis.
Submitted

IV. **Palmgren PJ** and Bolander Laksov K. Exploring chiropractic students' experiences of the educational environment in healthcare professional training: a qualitative study.
BMC Medical Education. 2015;15:128

V. **Palmgren PJ**, Liljedahl M, Lindquist I and Bolander Laksov K.
Chiropractic and physiotherapy teachers' experiences and conceptualizations of the educational environment – a qualitative exploration.
Manuscript

LIST OF RELATED SCIENTIFIC PAPERS

i. **Palmgren PJ** and Chandratilake M.
Perception of educational environment among undergraduate students in a chiropractic training institution.
Journal of Chiropractic Education. 2011;25:151-163

ii. **Palmgren PJ**, Chandratilake M, Nilsson GH, and Bolander Laksov K.
Is there a chilly climate? An educational environmental mixed method study in a chiropractic training institution.
Journal of Chiropractic Education. 2013;27:11-20

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LIST OF ABBREVIATIONS

AISP	Automated Item Selection Procedure
CoP	Communities of Practice
CLES+T	Clinical Learning Environment, Supervision & Teacher Scale
CPT	Chiropractic Teachers
CTT	Classical Test Theory
DMM	Double Monotonicity Model
D-RECT	Dutch Residency Educational Climate Test
DREEM	Dundee Ready Educational Environment Measure
ECTS	European Credit Transfer and Accumulation System
IIO	Invariant Item Ordering
IRR	Item Response Rate
IRT	Item Response Theory
IQR	Interquartile Range
KI	Karolinska Institutet
MHM	Monotone Homogeneity Model
NIRT	Non-parametric Item Response Theory
PCCS	Perceived Chilly Climate Scale
PHEEM	Postgraduate Hospital Educational Environment Measure
PIRT	Parametric Item Response Theory
PTT	Physiotherapy Teachers
SASP	Students' Academic Self-Perception
SCC	Scandinavian College of Chiropractic
SD	Standard Deviation
SPA	Students' Perceptions of Atmosphere
SPL	Students' Perception of Learning
SPT	Students' Perceptions of Teachers
SSSP	Students' Social Self-Perception
UCEEM	Undergraduate Clinical Education Environment Measure

1 INTRODUCTION

In the prologue, I addressed the metaphorical meaning of the thesis title in depicting how I am situated in this project and in denoting its dual aspects. Here, I introduce yet another metaphor, the garden metaphor, to invite the framing of what is to be inquired.

We can imagine an educational institution as a garden, its staff and employees as the gardeners, its students as flowers of different colors and varieties, and their common denominator – this thesis – as flowers from a Swedish garden. We want to maximize our knowledge of flowers, both in our own garden and in others, learn new skills about each flower variety, and follow the flowers' development and the bourgeoning of our garden. In which environments do they grow best, and what are the differences and similarities? The gardener's job is to get these flowers to reach their potential and to create the best possible environment in which they can grow and flourish. There are certain basic environmental requirements of soil and water that the flowers need: the right soil and the right amounts of water are a major challenge. However, there is no single way of proceeding as every flower is unique. Some flowers thrive best in a group while others require greater independence to grow. Some flowers need copious amounts of sunlight while others do not. Some require support mechanisms, such as sticks, string, or wire. Some will be so strong that they will grow beyond the flowerbed; they might even be able to grow through the tarmac. Some flowers grow very early in the season, others later. Thus, if we could explore the needs of the flowers, and the gardener's conceptions of these needs, we could gain further knowledge and a deeper understanding of what constitutes these environments, what specific quantities and qualities are required, and what it means to the actual context of different flower varieties.

In the context of education, environments often evolve like a dance – non-verbally and with a leader and a follower – and is thus in reciprocity with teaching and learning. In healthcare professional education, environments can further take on diverse attributes and settings. The key players in these environments are students and teachers, and the educational environment can be partially characterized by interactions between these two stakeholder groups.

When students enter an educational institution, they become aware of a detailed curriculum manifested through various means, e.g., course syllabi, resources, schedules, and examinations. Teachers become aware of the curriculum that they are expected to teach by means of course documentation and faculty discussions and assemblies. However, in addition to the documented curriculum, both key stakeholder groups become aware of and perceive a certain educational environment within the institution. Both students and teachers learn and work in a constant state of change within these environments. Their impression of the environment may be good, inspiring, or even optimal, but it is also likely to be unfavorable, discouraging, or even deplorable, with every possible shade of appreciation in between. Is the environment very competitive? Is it hierarchical? Is the academic atmosphere relaxed or in various ways stressful, maybe even intimidating? These are all key questions in determining the nature of the learning experience.

Consequently, although it is generally considered relevant to explore environments in order to assess educational quality, the concept of the educational environment itself, what it

encompasses and how it is thought, requires further elucidation. This, in essence, is the subject of this thesis.

OUTLINE OF THE THESIS

The focus of the current thesis is to contribute to the existing body of knowledge and to gain a deeper understanding of what constitutes educational environments and what they mean to different educational stakeholders, all with the pragmatic purpose of improving future healthcare professional education.

The prologue as well as this opening chapter attempt to declare my entry into, and how I am situated in, this project and to generally introduce the phenomenon under inquiry. Chapter 2 provides a theoretical and empirical background as well as a description of the central and prevailing ideas of educational environments. The overall aim of the thesis and the specific objectives guiding the studies are then put forward in Chapter 3. The subsequent chapter, Chapter 4, describes the theoretical underpinnings and research process regarding design, data collection, and data analysis. This section also comprises a rich description of the empirical setting in order to help the reader appreciate the context of this piece of scholarly work. The initial chapters – particularly Chapters 1 and 2, and the beginning of Chapter 4 – provide the overarching conceptual framework for this thesis. The main findings of the empirical studies, which constitute the body of the thesis, are described in Chapter 5.

In Chapter 6, the findings are discussed in relation to previous research and theoretical concepts in order to situate them on a more general or meta-level so that readers can consider the merits of my position, the quality of the supporting evidence, and whether the knowledge contributes to advancing understanding inside (in other contexts) and outside (other related phenomena) the phenomenon under investigation. Furthermore, in this section, the strengths and weaknesses of the methodology employed are addressed. Chapter 7 presents the conclusions with the intention of aligning and cohering with the stated aim and specific objectives of the thesis, and also outlines implications for practice as well as directions for future research. The intention here is not simply to achieve closure but also an aspiration to inspire different stakeholders such as scholars, researchers, teachers, and academic leaders in constructing and refining apt educational environments within healthcare professional undergraduate education. Finally, in the epilogue I invite for an illumination of the two sides of the tango.

2 BACKGROUND

This chapter seeks to articulate patterns within the scholarly literature, describe unsettled queries and issues, and show how this thesis fits into the larger scientific discourse and how it assumes its place in this particular field of inquiry. The chapter therefore has a three-fold purpose, scaffolding and funneling toward the rationale underpinning the central research aim of the thesis. First, it offers a theoretical and conceptual background as well as an outline and description of the key notions of educational environments. Second, it seeks to provide an overview of existing empirical research and scholarly work relevant to the scope of this project. Third, it attempts to depict the contextual uniqueness of the phenomenon of interest

EDUCATIONAL ENVIRONMENT – THE PHENOMENON

The phenomenon of the educational environment has been variously synonymized as spirit, climate, atmosphere, ambience, or culture. It is complex and multifaceted, and although frequently used in these different forms and contexts, it constitutes a somewhat vague and intangible theoretical construct of the context in which education is delivered; it is also characterized by a multitude of connotations and an inherent complexity (Genn & Harden 1986; Roff et al. 2001).

The environment

To explore the phenomenon of the educational environment, we can first turn to what we mean by "environment." The environment is a contested term, thus making a universally agreed definition notoriously difficult. This line of thought is important when theorizing the environment and its relationship with human social concerns, such as education. Thus, while the environment is often used to merely describe the world – that is, it tells us how the world in fact is – Barry (1999) has pointed out that it is also sometimes used to prescribe how the world ought to be, that is, to make normative claims about the world. One way to start thinking about the environment is to recognize various understandings of it. While the environment is often taken to refer to the nonhuman world, and occasionally comparable to "nature," it can take on a diversity of meanings. The root of the term environment derives from the French word "environ," which means "to surround," "to envelop." Another related and cognate French word is "milieu," which is often taken to mean the same as environment. However, in the French language, these two words are conventionally used slightly differently in different situations; but like many similar words in many other languages, the boarders have become indistinct and the terms are often used interchangeably. A central implication of this idea of the environment has been outlined by Cooper (1992:168): "An environment as milieu is not something it has." My interpretation of Cooper is that the environment is not just a passive background or context within which we live or exist. It is also something that is possessed; thus, to have an environment is an important part of what the entity is. Therefore, everything that surrounds or environs is an environment. However, on its own, "to surround" does not tell us very much. Therefore, we need to know what is surrounded, something specific to relate to (education, learning, humans, culture, or place); otherwise, the term environment becomes meaningless. The environment is thus a relational concept, and there is a need to know what or who the subject of discussion is in order to define the concept.

Education and learning – the push and pull model

In discussions on environments in healthcare professional education, there is a tendency to conflate learning and education. Both concepts are complex phenomena and can be assigned many different perspectives. To add weight to the discussion on the educational environment as a phenomenon, I suggest describing learning and education as a push and pull model. This model can seem rather simplistic but serves its purpose in this scholarly work. Notwithstanding, a more profound elucidation of my perspectives on learning will appear later in the chapter.

As a pull model, learning can be referred to as an act of absorbing, constructing, and extending knowledge, skills, and/or attitudes. As such, learning is something we constantly do – we can learn things that are useful or useless, good for us or dangerous. Learning is what we, as humans, do. Conversely, as a push model, education is an attempt to extend someone else's knowledge, skills, and/or attitudes. Education can be referred to as something done to us; we are often willing participants, but this is not a pre-requisite. Education is something deemed of value to the society in which it takes place (value-laden) whereas learning is value-neutral. Education is often externally motivated, deliberate, and/or coerced whereas learning is mostly internally motivated, often coincidental, and completely natural. However, the learning pull can occur with or without the education push, and the education push may or may not result in learning.

Climate versus culture discourse

As mentioned above, in healthcare professional educational research, the concept of the educational environment is often used interchangeably with those of climate and culture. However, organizational research has tried harder to conceptualize these notions, thus resulting in the concepts being exposed to a more prevalent and rigorous theoretical and empirical debate than in educational research.

Within organizational research, climate and culture are regarded as concepts describing a subset of the organization's internal environment. Although definitions of the two concepts vary, scholars have highlighted that it is useful to define them in ways that enable us to comprehend their core meaning (Asif 2011; Denison 1996; Peterson & Spencer 1990). In the organizational literature, Denison (1996) explored the difference between organizational culture and climate. He postulated that traditional methods of studying culture relate to qualitative research methods perspectives whilst climate has been conventionally studied through the application of quantitative methodological designs, thus "taking the temperature" of an organization. Table 1 depicts the main distinctions between the two concepts.

Table 1. Characteristics of organizational climate and culture (adapted from Denison 1996).

	Climate	Culture
Basis of concept	Perception of attitudes and feelings about organizational life	Deeply shared values, beliefs and/or ideologies of members
Conceptual source	Cognitive and social psychology	Anthropology and sociology
Epistemology	Comparative	Contextualized
Primary values	Comparison among organizations or over time	Identifies uniqueness in relation to other organizations
Methodology	Quantitative inventory data	Qualitative field observation
Analytical level	Surface-level manifestation	Underlying values and assumptions
Time perspective	Historical snapshot	Historical evolution
Major characteristics	Current patterns or atmosphere	Embedded or enduring
Theoretical foundation	Lewinian field theory*	Symbolic interaction and social construction
Primary elements	Common views of participants	Superordinate meaning

Overall, this theory emphasizes the role of the environment in determining individual behavior, assigning it a role equally important to that of personal factors (Bonnes & Secchiaroli 1995).

As a construct, climate derives mainly from cognitive and social psychology and studies of organizational behavior. There are many definitions of organizational climate, ranging from simple "a summary perception which people have of an organization" (Schneider & Snyder 1975:318) to more extensive and elaborate (Moran & Volkwein 1992; Peterson & Spencer 1990). However, a frequently used definition in organizational research is derived from the work by Hellriegel and Slocum (1974), who explained the climate as existing common patterns of important component parts of an organization's life or its members' perceptions of and attitudes toward those components. According to these authors, "the organizational climate is based on the assumption that individuals within a given subsystem or organization and at a given hierarchical level should have similar perceptions about their climate" (1974:256). One of the seminal publications on climate in organizational research was an article by Lewin and colleagues at the end of the 1930s. The authors asserted that artificially created social climates influenced aggressive behavior in young boys attending various club activities (Lewin et al. 1939). Consequently, in the 1960s and 1970s, there was a steep rise in the number of articles using surveys to assess organizational climate (Boor 2009).

Conversely, culture as an organizational construct emanates predominantly from sociology and anthropology and other strands of organizational behavior and psychology. Organizational culture has been variously defined (Bitsani 2013) and denotes a wide range of social phenomena, such as language, behavior, beliefs, values, assumptions, symbols of status and authority, myths, ceremonies, and rituals, all of which help to define an organization's character and norms (Scott et al. 2003). In the sense that it is discussed in this thesis, culture can be understood as emphasizing the deeply embedded patterns of organizational behavior and shared values, assumptions, beliefs, or ideologies that members have about their organization (Peterson & Spencer 1990). In the early 1980s, many scholars and researchers felt that deductively testing organizational climate might not be the optimal way to determine and understand how organizations really function. In reaction to this predominantly post-positivist approach, there was a subsequent increase in studies of organizational culture, which could be regarded as a sign of an "anti-climate movement." This was articulated by Schwartz and Davis (1981:32) who asserted that "whatever culture might be, it definitely was

not climate." Although undisputed definitions of climate and culture are lacking, it is generally assumed that organizational culture is linked to "deep," taken-for-granted assumptions that emerge through more "superficial," observable behaviors and artefacts (Boor 2009). Thus, according to Hellriegel and Slocum (1974), climate is more concerned with current perceptions and attitudes than deeply held meanings, beliefs, and values. The purposes served by organizational climate reflect its psychological base and individual-level focus as opposed to the more holistic approach of culture.

A conspicuous difference between the two concepts relates to questions of epistemology and methodology. Climate-orientated investigators generally tend to assess knowledge of climates in relation to other climates and aim to compare. However, most culture-orientated investigators are mainly concerned with valuing the contextualized knowledge of the culture under study. As for methodology, climate investigators mainly employ quantitative methods by means of inventories whereas culture researchers focus on the unique and situated characteristics of social action, using qualitative methods connected to ethnography and anthropology. However, several authors (Bates & Khasawneh 2005; Bitsani 2013) have advocated for integrative methodological approaches toward organizational climate and cultural research to govern efforts to understand institutional dynamics. Nevertheless, none of these advances has yielded undisputed definitions, neither of climate nor of culture, within organizational research.

Pivot terms

The use of different concepts relating to or describing the educational environment and how academics, scholars, and investigators merge these concepts can be understood from multiple angles. From a pragmatist perspective on language, words do not have indispensable or universal meaning but must be understood as part of an activity, context, or what Wittgenstein called a "language-game" (Wittgenstein 1953). The meaning of a word or concept lies in its consequences, which are not disconnected from each other by sharp boundaries (Wickman 2004; Wittgenstein et al. 2010). Hence, an isolated word is, in a sense, an imaginary abstraction and has meaning only when used in a context, which means that it has consequences for action (Grayling 2001). This suggests that to learn a language-game does not simply involve knowing the use of certain words but also acquiring habits of using these words as part of a context and in an activity.

In this thesis, I make use of what I call pivot terms. As pivot means to swivel, and also a dance term referring to make a quick half a turn, I use the term to describe how the composition of related words – such as environment, education, learning, climate, and culture – creates different concepts, concepts that perhaps overlap or intersect but also create some confusion. Many of these words have diverse connotations among individuals and groups as well as within different organizational cultures, traditions, and perspectives and their associated language-games. If the customs of using a particular term differ significantly between two cultural institutions, I would designate this as a pivot term (Table 2). Thus, the use of potential pivot terms is a way of operationalizing how specific words in concepts can play a central role and, particularly in this thesis, help to frame the phenomenon of the educational environment.

Table 2. Pivot terms derived from combinations of prefixes and suffixes.

	-environment	-climate	-culture
Learning-	Learning environment	Learning climate	Learning culture
Educational-	Educational environment	Educational climate	Educational culture

Operationalizing the phenomenon

In the present thesis, the educational environment assumes center stage and is the pivot term and investigated phenomenon. However, this does not refute other pivot terms or their components, the interaction and overlapping of the concepts, and the fact that their nonexistent demarcations are well recognized. Using the push and pull model, the prefixes used in Table 2 can be viewed from two main perspectives: "learning" – regarded as a more individual focused and pedagogically-orientated part of a pivot term – and "educational" – designated more toward an organizational orientation of it. Thus, this thesis takes an inclination toward the latter. Here, the term education, including its adjective form, educational, refers to formal efforts to provide information and experiences and to develop new skills and competencies among healthcare professional students or practicing professionals (Knebel & Greiner 2003). Healthcare professional education is also used in this thesis as all-encompassing term relating to the education of professionals who are operating within different branches of healthcare such including medicine, nursing, dentistry, or allied health such as chiropractic and physiotherapy. Moreover, the term training is also used, in which context it is regarded as a subset of education (i.e., training is a form of education) but is also used synonymously with educational institution (i.e., a chiropractic training institution).

The vagueness of the concept of the educational environment makes definitions challenging (Isba & Boor 2011; Isba 2015), although some attempts have been made. One of the pioneers contemplating the phenomenon in healthcare professional education was Jack Genn. He postulated in his seminal paper (2001b) that the educational environment of professional healthcare education is both a manifestation of the curriculum and a determinant of the behavior of its primary stakeholders. Others have proposed it as "a subtle concept, encompassing physical, interpersonal, and organizational elements" (Rotem et al. 1996:706) and "a set of features that gives each circumstance and institution a personality, a spirit, a culture and describes what it is like to be a learner within that organization" (Holt & Roff 2004:553). These definitions suggest that assigning meaning is not easily arrived at and that the phenomenon of the educational environment and efforts to consensually define it remain elusive. This difficulty is probably due to its all-embracing nature, which has been a source of criticism in attempts aiming to define the concept (Isba & Boor 2011).

Another plausible reason for the deficiency in conceptual framing could be that researchers were initially more occupied with attempting to measure the concept of the educational environment rather than trying to conceptualize and theorize it (Schönrock-Adema et al. 2012). Schönrock-Adema et al. (2012) have highlighted that many empirical studies of environments in healthcare professional education employ measures that are not grounded in theory and that the deficiency of such frameworks may explain some differences regarding the concept. The authors consequently proposed a theoretical framework based on their

literature review and empirical investigations developed by Moos (1973) to underpin investigations of the environment phenomenon. Moos and Trickett (1987) argued that social environments have important effects on satisfaction, learning, and personal growth and went on to present a social-ecological framework based on three assumptions. First, one can distinguish different dimensions of social environments. Second, these dimensions have distinct influences on people. Third, these social influences tend to differ from person to person. Based on these assumptions, Moos developed a conceptual framework suggesting that people and environments reciprocally influence each other, creating a mediating process of cognitive appraisal, arousal, and coping behaviors. According to Moos (1973), human environments can be conceptualized within three broad domains: personal development or goal direction; relationship; and system maintenance and system change. Moos persuasively argued that the aforementioned domains underpin most socially-created environments and that vastly different social environments, including educational, can be investigated using these social domains. Moos' attempts to evaluate the impact of social environments in educational settings were motivated by three converging lines of research at that time: 1) personality and traits could only account for part of the variance in behavior; 2) stable long-term settings may have a significant influence on human characteristics; 3) social environments tend to significantly influence behavior (Walsh 1980).

It can be deduced from the above discussion that the educational environment as a phenomenon constitutes not only externalized and tangible objective components, such as the surrounding and physical space, but also subtle and internalized features, such as the "personality" traits of an institution, and carries social, emotional, and intellectual connotations. These environments often evolve in symbiosis, or are juxtaposed, with teaching and learning and can be of diverse character such as academic, clinical, formal, and informal. The key players in these environments are students and teachers, although many other stakeholders exist, and the educational environment can be partially characterized by interactions between the two.

In order to operationally frame the phenomenon under inquiry in this thesis, I was inspired by the organizational research literature that encompasses a rather broad definition of the organizational environment (Peterson & Spencer 1990). Here, the educational environment is regarded as an extensive concept, potentially comprising all internal and external organizationally-related phenomena, as well as the acknowledgement of climate and culture as concepts describing subsets of the internal environment. Operationally, therefore, the educational environment can be seen as the totality of its surrounding conditions.

In this thesis, I use the pivot term educational environment throughout. However, I do recognize the line of thought that the environment, as perceived, may be designated as the climate. I also acknowledge the experiences of the educational environment in the form of its culture – deeply shared values and beliefs. In concurrence with Peterson and Spencer (1990), one implicitly understands the concepts, climate, and culture. Thus, using the inspirational work of Goffman's (1959), dramaturgical perspective on social interaction, climate and culture are viewed in this thesis from a backstage perspective while the educational environment, the phenomenon of interest, is viewed frontstage.

CONTIGUOUS PHENOMENA

Two concepts regarded as closely related to the educational environment phenomenon are the hidden curriculum and the chilly climate. Their relations to the educational environment are explored below.

The hidden curriculum

The curriculum can be viewed as the backbone upon which education is organized, and there are numerous ways of delineating and describing it. Harden (1986) and Dent and Harden (2005) state that the curriculum must be seen as covering not only what is taught but also how it is taught and learned, how the learning is managed, and the overall environment. One practical way to think about the curriculum within a healthcare professional educational institution is as a whole that constitutes three aspects – the formal, the informal, and the hidden (Hafferty 1998). The educational environment has elements that overlap all three aspects of the curriculum. Of importance to this thesis is the recognition that educational environments form part of a large and complex entity that interacts with all three parts of an educational curriculum, in particular, with the hidden curriculum.

In recent years, educators have acknowledged the importance of differentiating between formal-explicit and informal-implicit hidden dimensions in the process of becoming a healthcare professional (Hafler et al. 2011). The formal curriculum, here narrowly defined, refers to the actual course of study, the planned content, teaching, and evaluation approaches used in any educational setting and includes formal policy statements and regulations.

Interwoven with the formal curriculum are its hidden/tacit dimensions. The informal curriculum, which deals with formal learning settings, denotes what takes place in hallway interactions, during breaks, in faculty offices, or the countless other settings in which peers, teachers, learners, and other educational stakeholders interact. Moreover, the informal aspect of the curriculum also takes place in clinical settings where it is probably more obvious, with elements such as the opportunistic, idiosyncratic, and often accidental instruction takes place between anyone who is teaching and the learner.

The hidden curriculum refers to cultural values that are transmitted, though not openly acknowledged, through formal and informal educational endeavors (Hafferty 1998). The concept was originally coined in the 1960s by Philip Jackson (1968), a sociologist and scholar, in an ethnographic study exploring elementary school classroom teaching. However, the concept resembles Dewey's concept of "collateral learning" in educational settings, which may have more of a lasting effect on learners than the formal curriculum (Portelli 1993). Most of the literature on the hidden curriculum is derived from general educational and curriculum research and theory. Notwithstanding, the issue of the hidden curriculum is now widely understood in healthcare professional education (Hafferty 1998; Hafler et al. 2011; Lempp & Seale 2004; Phillips & Clarke 2012). It can be defined as "a set of influences that function at the level of organisational structure and culture" (Hafferty 1998:404). However, it differs from the informal curriculum, which is more of an unscripted form of teaching and learning (Hafler et al. 2011). Lempp and Seale (2004:770) expanded on Hafferty's concept, adding "the set of influences that function at the level of organizational structure and culture, including, for example, implicit rules to survive the institution such as customs, rituals and

taken for granted aspects." Harden (2001:335) described the hidden curriculum as "the values and patterns of behavior that are acquired, often incidentally." Thus, it can be reasoned from the above that the concept of the hidden curriculum includes ideological and subliminal messages generated from both the formal and informal curricula. Arguably, however, the hidden curriculum forms a contiguous phenomenon of the educational environment, not to be viewed as a simple dichotomy between the formal and hidden curricula. Thus, the hidden curriculum is neither written somewhere, nor is it taught by faculty. Rather, perhaps, it is embedded in and interacts with the educational environment as a response to what educational stakeholders observe, hear, encounter, feel, learn, and do in their environment.

The chilly climate

Roff and McAleer (2001) have drawn attention to another phenomenon that is, in some ways, related to the educational environment – the concept of the "chilly climate." Hall and Sandler (1982), inspired by critical theory, coined the term to describe the subtle but different ways in which women in academia are treated. Gender equality or inequity is interwoven with all actions, interactions, and occurrences within an educational institution. It has been reported that women perceive the climate as chillier than their male counterparts (Carr et al. 2000; Morris & Daniel 2008; Nora et al. 2002). The chilly climate concept has evolved over time, and today, it is used to study gender issues as well as ethnicity and minority issues in higher education settings. Thus, the concept describes an environment in which individuals or groups often feel isolated, marginalized, and even unsafe (Ng 2013).

Physiotherapy was originally considered a male-dominated occupation. During the course of history, the profession has changed character and, from the beginning of the 1930s, became dominated by women (Johansson 1999). Häger-Ross and Sundelin (2007) reported that 70% of undergraduate students in physiotherapy are female; in the working population of qualified physiotherapists, the proportion of women is around 80–90%. Although men have been entering the profession in larger numbers in the last several years, the workforce remains predominantly female (Schofield & Fletcher 2007). However, chiropractic has not followed the same historical gender shift and has remained a male-dominated profession. Johnson and Green (2012) reported that in the US, the workforce of qualified chiropractors consists of about 75–80% males. In the Swedish context, this proportion stands at 70% of undergraduate students (Palmgren et al. 2013), although in recent years this proportion has decreased. It is interesting to observe the near-inverse relationship when contrasting the gender distributions between the two professions.

Instruments aimed at assessing higher education students' perceptions of the chilly climate have been designed, one of which is the Perceived Chilly Climate Scale (PCCS) developed by Janz and Pyke (2000). In modern-day educational institutions, it is unlikely that inequities are always gross and apparent, but they may exist in a subtle manner (Palmgren et al. 2013). Roff and McAleer (2001) have asserted that if topics such as racism, ageism, and sexism are indelibly linked to the environment, they need to be identified and immediate action taken. The educational environment should accommodate the needs and aspirations of its stakeholders and should be sensitive to their demographic backgrounds, such as ethnicity and gender. Though it is not within the scope of this thesis to investigate the chilly climate, the concept is closely linked to the educational environment phenomenon, with some overlapping

features. Thus, the concept can be used to assist in the theoretical framing of the investigated problem.

THEORETICAL PERSPECTIVES ON LEARNING

The current thesis does not set out to investigate learning per se, and neither does it explicitly set out to examine educational stakeholders' perspectives regarding learning, neither as an outcome nor as process influenced by the environment. Rather, the focus is on education – more from an organizational perspective and at the center of this work is the intangible construct of the environment within which education is delivered. Yet, theoretical perspectives on learning can be useful in extrapolating the findings generated from this thesis to a more general level, thus making them transferable to other contexts, and in advancing understanding of how learning fits into other aspects of the educational environment phenomenon.

Learning is a complex phenomenon that can be described from different perspectives. Understanding learning is about understanding not only learning processes but also the conditions that influence – and are influenced by – the learning process (Illeris 2009). In this thesis, learning is understood from a constructivist and social-constructivist perspective in which reality and new understanding are constructed by learners on the basis of their previous knowledge, perceptions, and experiences. Learning thus consists of 1) contextual aspects, i.e., distinguishing that teachers present information in a way that enables learners to construct meaning on the basis of their own experiences as well as a focus on situating learning in an authentic activity; 2) cognitive aspects, i.e., recognizing individuals' perception, memory, and making-meaning; and 3) social aspects, i.e., converging on learning as a social activity that occurs in interactions between the learner and others (Mann et al. 2011; Simons et al. 2000).

Concurring with Mann et al. (2011), because of the inherent struggle in understanding how different learning perspectives can complement or diverge from each other, learning perspectives can be organized according to a Cartesian coordinate system with a continuum of an abscissa and an ordinate (Figure 1).

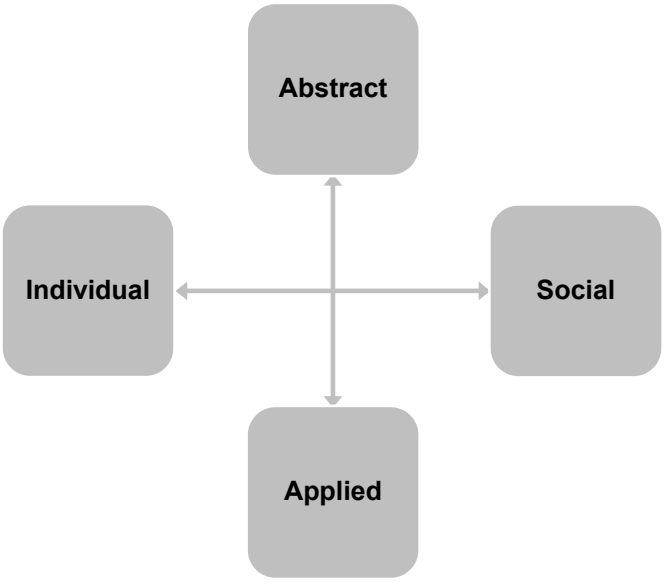

Figure 1. A depiction of constructivist views on learning (adapted from Mann et al. 2011).

Thus, learning perspectives can be considered to the extent that they illuminate and take on learning as either more individualized or social processes (abscissa), or they can be thought of as offering either abstract conceptualizations or guiding principles that can be applied directly to educational practice (ordinate). As this thesis focuses particularly on educational environments, theoretical perspectives on learning are drawn primarily from the upper-right quadrant. Thus, I argue in this thesis that learning is best understood when it is seen as incorporated into a social and contextual matrix; and what is understood as learning and knowledge is situated and binding in a historical time and cultural context (Brown et al. 1989; Lave & Wenger 1991; Wenger 1998).

During the last decade, there has been a growing interest in sociocultural perspectives on learning. These perspectives draw heavily on the work of Vygotsky, who delineated that all learning is social (Vygotsky 1978). In congruence with Schönrock-Adema et al. (2012), I assert that sociocultural frameworks can assist in helping to broaden the perspective of educational environments. There are various strands of sociocultural theory, and their common perspectives on mind, action, context, culture, and the dynamics of learning are that which conjoins them. Vygotsky's notion that learning is inherently social and embedded within a particular cultural context led to Lave and Wenger's conceptualization of situated learning (Lave & Wenger 1991). According to Wenger (1998:3), learning has often been assumed as "a beginning and an end; that it is best separated from the rest of our activities; and that it is the result of teaching." However, in the late 1980s and early 1990s, Lave and Wenger contemplated how things would look if they assumed that learning was social and emanated largely from our experience of participating in daily life. This notion formed the basis of a rethinking of learning theory. Consequently, within Lave and Wenger's (1991) model of situated learning emerged the proposal that learning involved a process of engagement in a "community of practice."

Communities of practice (CoP) is a neo-Vygotskian theory that explains how groups of people who share a concern or passion for something do and learn how to do it better with regular interaction. However, this learning is not necessarily intentional. For Wenger (1998:73), shared practices are a source of local coherence; a successful community of practice ensues and is characterized by "mutual engagement" in a "joint enterprise" that results in a "shared repertoire" of performances. Negotiating a joint enterprise, he argued, gives rise to relations of conjoint accountability between those involved. However, in his later work, in an effort to enable organizations to use CoP as a management tool, Wenger et al. (2002) revised the three characteristics, labelling them "domain," "community," and "practice." Wenger (1998:3) sees learning as "a fundamentally social phenomenon, reflecting our own deeply social nature as human beings capable of knowing." Within communities of practice, learning is further defined as "An interplay between social competence and personal experience. It is a dynamic, two way relationship between people and the social learning systems in which they participate" (Wenger 2000:227). He formulated this definition of learning from a social learning standpoint. His notion of mutual learning has been supported by Viskovic (2006), who maintained that learning can be formal (as in an educational setting) or informal (as in daily activities), highlighting an incessant process of inquiry. Thus, learning is a course as well as a process that has no distinguishable start or end and is cultivated through interaction with our environment. Jonassen and Land (2012) have suggested that we

think about the characteristics of communities of practice, the advantages of learning from them, and the approaches used by educators to develop them into educational institutions. The community of practice framework does have limitations as a notion, and some of these have been articulated by Roberts (2006) and Kerno (2008): i) differences in broad socio-cultural environments will impact on the success of a community of practice; ii) recognizing the boundaries of a community of practice may not reflect organizational boundaries; iii) variations in organizations of different sizes will influence the accomplishment and prevalence of a community of practice. I recognize that the community of practice perspective is primarily a framework for learning but argue for the integral dance between education and learning. Furthermore, as this work takes on a more organizational perspective of the educational environment phenomenon, it has been underlined by Easterby-Smith and Araujo (1999) that Lave and Wenger's work (1991) also contributes a useful addition for those concerned with organizational development. Consequently, in this thesis, the framework of communities of practice is used as an overarching theoretical perspective that seeks to shed light on the phenomenon of the educational environment.

The theory of situated cognition coheres with the communities of practice framework. Brown and co-workers (1989) are often credited with developing situated cognition, which theorizes that learning is social and not isolated and that the activities of persons and the environment are parts of a mutually constructed whole. While situated cognition gained recognition in the field of educational psychology in the late twentieth century (Brown et al. 1989), it shares many principles with other older fields that rejected the notion of truly objective knowledge and some of the principles of Kantian empiricism. Thus, Brown et al. (1989) have highlighted that learning constructs are inextricably linked to situations and culture. Further, Barab et al. (2000) have advocated communities of practice as the de facto contexts for situated cognition. Hung et al. (2004) have posited that situated cognition takes a firm stand on the role of communities of practice as situated contexts through which cognition and context are always co-determined. Schumacher et al. (2013) have noted that situated cognition has led some scholars to advocate a cognitive apprenticeship model. Situated cognition can therefore illuminate the learning process in educational environments as it focuses on how people learn in their authentic contexts. The theory can further help educators understand how to capitalize on knowledge and skills that learners may already possess in order to help them learn new content and skills. Situated cognition is used in the thesis as an operational theoretical perspective; it is thus juxtaposed and used as a grid to scrutinize specific parts of the educational environment being studied, in particular, aspects of the instrument employed that are directly pertinent to the investigated environments.

Even though the various above-presented theories have their own identity, they also have many commonalities and emphasize both the context in which learning occurs and the social contexts that learners bring to their environment. The theories provide some important and unique perspectives that are relevant to the phenomenon of the educational environment.

MEASURING AND EXPLORING THE EDUCATIONAL ENVIRONMENT

Several research approaches – quantitative, qualitative, and mixed methods – have been employed to inquire about and understand the somewhat ethereal features of educational environments. However, there is an overwhelming abundance of instrument-driven inquiries measuring the phenomenon. Measurement has been defined as the process of applying numbers to objects in meaningful ways (Stevens 1951). Thus, measurement involves constructing a formal model of a data set. Some sciences engage in the measurement of different phenomena, such as temperature with a thermometer and length with a ruler. However, in other sciences, such as education, scholars are preoccupied with psychological measurements and concepts like perceptions of and attitudes towards different phenomena. According to (Bryman 2012:164), a social research methodologist, there are three main reasons for the preoccupation with measurement in quantitative research: i) measurement allows to delineate fine differences between people in terms of the phenomenon in question; ii) measurement gives a consistent device for making such distinctions; and iii) measurement provides for more precise estimates of the degree of relationships between phenomena. While systematic investigations of temperature and length with reliable measurements have been developed over centuries, systematic investigations into psychological measurements was undertaken only a century ago (Sijtsma & Molenaar 2002). I do however believe that this is not merely a matter of a time lapse. Psychological measurement is inherently more difficult due to the properties being measured and do not lend themselves equally straightforwardly to direct observation with a commonly accepted method. Measuring psychological attributes such as perceptions of a phenomenon among individuals may thus be difficult albeit desirable.

Various instruments can be used to measure the educational environment, each with its strengths and drawbacks. The use of quantitative introspections can provide useful insights and enable an extensive focus on educational stakeholders' perceptions. However, this can also be daunting because of the risk of excluding fundamental features or of simply generating instantaneous depictions of an environment. Notwithstanding, while qualitative explorations can be critiqued for their narrow focus and inductive approach, thus moving from the specific to the general, common themes can surface and lead to the development of theoretical generalizations.

Quantitative approaches

As the educational environment is primarily a theoretical construct, it cannot be measured directly. It is however manifested in educational stakeholders' mundane perceptions, which can be assessed. The inquiry into educational environments dates back to the 1930s but intensified with the works of Pace and Stern (1958) and Moos (1973). These works attempted to quantify the environment in order to allow longitudinal studies and assessments among different situations by investigating students' perceptions. With the use of measurement instruments, actual assessments are a matter of operationalizing and objectifying the educational environment as a phenomenon. As such, with the intangible nature of the educational environment, it can somewhat be assumed that the construct itself is demanding and that the quality of the measurement is not incontrovertible.

According to Pace (1963), what should be introspected in the environment relates to the overall atmosphere and characteristics of the educational institution, what is encouraged and emphasized, and what is valued in the classroom or school and is most discernibly expressed and felt. With the advancement of research, the somewhat elusive concept of the educational environment began to take shape as quantifiable elements in psychometric scales. However, the majority of these studies were targeted toward primary and secondary educational institutions and those of higher education (Fraser 1986; Moos & Trickett 1987; Thistlethwaite 1962), though not exclusively in healthcare professional education.

Gauging environments in formal education

In healthcare professional education, scholars have over the years attempted to observe and quantify the presence and impact of the educational environment. One commonality and encompassing aim among various instruments in soliciting perceptions of the educational environment is the incentive to develop educational environments that are beneficial and favorable to learning. Arguably, there are three prerequisites for such instruments: i) identification of key elements that contribute to a particular environment; ii) identification of the best available instrument to measure the environment and to allow precise assessments; and iii) identification of areas requiring urgent attention. The first published instrument measuring the environment in healthcare professional education, the Medical School Environment Index (MSEI), was developed by Hutchins (1961). This tool hinged on the work of Pace and Stern (1958) in the College Characteristics Index (CCI), a tool used in higher education. The MSEI was adapted by the Association of American Medical Colleges and was launched as a 180-item instrument comprising 18 subscales assessing the perceptions of the environment among peer; students and faculty. Rothman and Ayoade (1970) constructed the Learning Environment Questionnaire (LEQ), which was employed by Levy and colleagues (1973) to evaluate curricular change in formal, non-clinical environments (e.g., academic enthusiasm, goal direction, authoritarianism, and student interaction). Marshall (1978) cultivated an inventory founded on the work by Rothman and Ayoade (1970) and Levy et al. (1973), which was used to measure aspects of the educational environment relevant to student stress. Following a period of reduced scholarly activity on the topic, the 1990s saw an upsurge in interest in measuring educational environments. Since then, many instruments have evolved to measure either the educational environment of specific specialties or that across specialties. Thus, educational stakeholders' perceptions of the environment have featured as an important topic of research in healthcare professional education for more than half a century (Colbert-Getz et al. 2014). However, in this four- to five-decade history, several of the instruments have now become obsolete as they do not take into account recent imperatives for curriculum change and the paradigm shift to student-centered learning and teaching.

Three reviews have explored instruments used to measure the environment in formal settings – formal environments – in healthcare professional education. Soemantri et al. (2010) extracted 15 instruments in a systematic review, 12 targeting medical education and three targeting nursing and dentistry education. The authors concluded that valid and reliable instruments are available for these and other educational settings and that measuring the environment should become part of educational institutions' good practice. Schönrock-Adema and colleagues (2012) executed a study with the overarching aim of generating a

theoretical framework to inform future tool development. They identified 11 tools, four of which were specifically designed for gauging formal environments. The authors highlighted that the examined tools revealed several similarities and recurring themes (e.g., teaching, learning, atmosphere, emotional facets, and social aspects) as well as some dissimilarities (e.g., the number of subscales and the number of items included in the subscales). In their review, Colbert-Getz et al. (2014) identified 15 inventories assessing the educational environment; of these, seven were designed for evaluating general formal environmental settings while eight were designed for specific populations and settings within the environment.

The Dundee Ready Educational Environment Measure (DREEM) is the most extensively used instrument to gauge, evaluate, and compare various aspects of the educational environment (Colbert-Getz et al. 2014; Soemantri et al. 2010), although it has been criticized for its pervasive use (Colbert-Getz et al. 2014). The DREEM has been touted as the most suitable instrument for measuring the environment in undergraduate healthcare professional settings (Soemantri et al. 2010) and has, until recently, been one of the few recognized and contemporary instruments for exploring the educational environment in formal settings (Shochet et al. 2015).

DREEM – Background and development

At the beginning of the 1990s, Roff and colleagues from the Centre for Medical Education at the University of Dundee, Scotland, took on the work to create a novel inventory to measure the quality of the educational environment in healthcare professions. Moreover, the seminal work, Tomorrow's Doctors (1993), and Genn and Harden (1986) served as a catalyst at the time. Published by the UK General Medical Council, "Tomorrow's Doctors: Recommendations on Undergraduate Medical Curriculum" (1993) was the product of rapid change in the educational missions and mandates of healthcare professions around the world in the 1980s and 1990s and had a tremendous impact in Britain and elsewhere (Dennick & Exley 1997; Lewington 2012). This document targeted the education of medical doctors and impacted other healthcare professional educational systems (Lewington 2012). One can more or less retrospectively infer that the document obliged educational institutions to change their raison d'être. Its overarching message was: be nice to students, do not squash students, engage students, focus on essential skills, and create environments that are apt for learning. In Britain at the time, teaching in medical education was still hierarchical and authoritarian, and students perceived significant amounts of stress as well as feelings of being oppressed (Sue Roff, personal communication, London, 20 January 2015). Genn and Harden (1986) reviewed instruments that have been developed to measure the environment of higher education institutions, particularly those concerned with highly pressured professional vocational training, such as healthcare professional education. They supported the notion of teachers engaged in healthcare professional education as action researchers using environment-related instrumentation and research strategies to understand the nature, and improve the quality, of the educational experience that students gain in departments, classrooms, and other settings.

With this as a scaffold, Roff and co-workers (1997) began the construction of an inventory for assessing the whole or parts of the educational environment of healthcare professions to allow evaluations of their responses to the challenges of changing mandates and missions (personal communication, London 20 January 2015). The inventory emerged through the employment of a combination of qualitative and quantitative methods. During 1994 and 1995, the constructors began by collecting student diaries and performing observations during curriculum planning committee meetings. By means of a Delphi process, they subsequently convened two panels of faculty teachers from health professional institutions around the world, asking them to identify what they considered to be positive and negative features of an effective educational environment. Faculty members based their responses on a review of the literature, conjointly with their own experiences as students and then as teachers, generating a 110-item inventory. In 1996, an additional panel consisting of faculty of a similar background was recruited, and a third iteration was performed in which the inventory was reduced to 58 items and major changes in item syntax and phraseology. This preliminary inventory was then field-tested on healthcare professional students in Bangladesh, Argentina, Thailand, and Ethiopia. The outcome of the field studies in Bangladesh and Argentina resulted in two diverse and five corresponding subscale structures, which were tentatively named. After this process, there was an elimination of double negatives and other convoluted formulations from several of the items. The preliminary instrument was thus further refined, and Roff. et al. (1997) presented the completed version, DREEM, a universal inventory and a 50-item diagnostic tool comprising closed statements congregated into five subscales to identify students' perceptions of five aspects of the educational environment: perceptions of learning, teaching, academic self-perceptions, perceptions of atmosphere, and social self-perceptions. The name of the DREEM inventory is mostly self-explanatory except for the word "Ready," which has generated some confusion. According to Roff (personal communication, London 20 January 2015), the intention was to create an easy-to-use measure with simple statistics, and the word "Ready" connotes "with ease" and "quickly" and was derived from "ready reckoner," a table of numbers used to facilitate simple calculations. The DREEM instrument was later translated into a multitude of languages such as Swedish, German, Spanish, Greek, Arabic, Chinese, Thai (Al-Hazimi et al. 2004a; Dimoliatis et al. 2010; Edgren et al. 2010; Pimparyon 2000; Rotthoff et al. 2011; Tomás et al. 2014; Wang et al. 2009).

DREEM in the literature

Colbert-Getz et al. (2014) recently reported that in studies gauging the educational environment among medical students, the biggest group introspected in healthcare professional education, DREEM was used more than nine times more frequently than other instruments.

Roff (2005) identified a number of areas in which the DREEM instrument can be used: i) to profile a particular educational institution's strengths and weaknesses; ii) to make comparative analyses both within an educational institution and between institutions or between different cohorts; iii) to determine correlations with academic results; and iv) to explore students who are likely to be academic achievers and those at risk of poor academic performance. A probe of the scientific literature revealed that the most conspicuous area investigated, with a plethora of scientific studies, is profiling, which allows institutions to benchmark the educational environment they are providing (Aghamolaei & Fazel 2010;

Dunne et al. 2006; Ostapczuk et al. 2011; Ousey et al. 2013; Palmgren & Chandratilake 2011; Vaughan et al. 2014b). However, other domains have also been repeatedly explored, such as identifying weaknesses in curricula with a view to introducing change (Al-Hazimi et al. 2004b; Bouhaimed et al. 2009; Shehnaz & Sreedharan 2011; Till 2005); assessing the impact of new curricular interventions (Demiroren et al. 2008; Edgren et al. 2010; Till 2004); gauging perceptions of the environment at various levels of a training (Zamzuri 2004); identifying the gap between student expectations and experience (Miles & Leinster 2007) and students' actual and idealized experience (Till 2005); assessing differences between students' experiences at different sites within an educational institution (Bennett et al. 2010; Carmody et al. 2009); and predicting the relationship between the educational environment and students' academic achievement (Mayya & Roff 2004; Pimparyon 2000). However, scholars have pointed to the dearth of studies regarding the latter of these exploratory foci as well as those investigating the environment longitudinally (Demiroren et al. 2008; Litmanen et al. 2014).

As outlined above, the DREEM inventory has been used extensively. Some studies have employed the instrument in contexts similar to those investigated in this thesis. Brown et al. (2011) used the DREEM to investigate eight different health science programs in Australia. Physiotherapy students generally held positive perceptions of their educational environment in terms of the overall DREEM score. However, there were gender differences, with females being more positive. Students who did not enroll directly after completing high school recorded higher DREEM scores; and DREEM scores were highest at the beginning of the programs. Ousey and colleagues (2013) employed the DREEM across six undergraduate healthcare courses in the United Kingdom, including physiotherapy students, and their overall DREEM score findings were comparable with those of Brown and colleagues. However, both of these studies used very small samples (n = 33 and = 22, respectively) and did not comprehensively investigate demographic variations. Edgren et al. (2010) scrutinized how medical students in Sweden perceived their educational environment and compared their DREEM findings from two specific time points during an episode of curricular reform. The overall DREEM scores were high both before and after the implementation, suggesting that the perception of the educational environment would remain high during ongoing curricular reform. There were hardly any gender differences, but certain items received low ratings, such as a perceived lack of a support system for stressed students and a lack of feedback and constructive criticism from teachers. Till (2004) administered the DREEM inventory at a chiropractic educational institution in Canada. The overall scores were conspicuously low. It was reported that students became more critical of the educational environment as they progressed through the program. Due to very low mean scores for the third year, the author called for urgent remedial action. However, Till used a cross-sectional design with no discussion on fluctuations in student cohorts or considerations of longitudinal differences; further, the statistical analysis and some level of data presentation could be questioned.

As demonstrated, the existing literature contains a wealth of empirical work investigating students' perspectives of the educational environment. However, students' perspectives are only one side of the coin; the view of faculty and other stakeholders are similarly important. As teachers often remain in an environment for extended periods, it is judicious to assume that they would have alternative perspectives of the environment. Moreover, as they have a

completely disparate angle and role in the educational environment, it is also plausible that they experience it differently. Attention has been drawn to the paucity of DREEM studies (Ostapczuk et al. 2011; Rotthoff et al. 2011) as well as others (Miles & Leinster 2009) in investigating teachers' perspectives on the environment. Miles and Leinster (2009) have emphasized teachers' unfamiliarity with certain aspects of the educational environment and suggest the need for further investigation.

The DREEM inventory has contributed to establishing a greater contextual understanding of professional healthcare education, including in relation to the broader healthcare community. In a recent systematic review (Soemantri et al. 2010), it was proposed that the DREEM was likely to be the most suitable instrument for measuring the environment in undergraduate professional healthcare educational settings. The DREEM has proven to be internationally useful in a variety of healthcare settings (Roff 2005). Numerous professions, such as medicine, nursing, and dentistry, have to a greater degree executed empirical investigations of educational environments by means of the DREEM (Avalos et al. 2007; Edgren et al. 2010; Hamid et al. 2013; Ostapczuk et al. 2011); however, other professions have done much less, and two scarcely researched environments are chiropractic and physiotherapy education.

Psychometric properties of DREEM

In the initial psychometric evaluation of the DREEM carried out by its originators, the instrument was reported as portraying good psychometric characteristics in its original contexts (Roff. et al. 1997). In the empirical studies that ensued, the inventory was shown to have good evidence on the basis of test content – content validity – and internal structure – construct validity (de Oliveira Filho et al. 2005; Edgren et al. 2010; Roff. et al. 1997) and displayed good reliability in diverse settings (Bassaw et al. 2003; Demiroren et al. 2008; Foster Page et al. 2011; Till 2004). Nevertheless, recently, investigators have impugned these psychometric properties, asserting that the model itself may be in need of revision (Hammond et al. 2012; Jakobsson et al. 2011; Vaughan et al. 2014a; Yusoff 2012). Reproductions of the a priori five-scale structures have only been partially successful, with some conflicting evidence in the scholarly literature (Hammond et al. 2012; Jakobsson et al. 2011; Tomás et al. 2014). Further, Vaughan et al. (2014a) have advocated caution when calculating the overall sum score as the DREEM has been problematic in measuring single underlying constructs. Notwithstanding, the constructors designed a multidimensional tool and intended for the item scores to be used and combined, so this question can be put aside for the time being. Jakobsson et al. (2011) psychometrically evaluated the Swedish version of the DREEM on a population of medical students and reported it as valid and reliable, except for the subscale structure. These authors also suggested a potential new five-subscale solution for the Swedish version, but it has yet to be proven to be superior to the original (Jakobsson et al. 2011). Notwithstanding, the fact that the DREEM is pervasively utilized for cross-national comparisons suggests that it is particularly important that it is subject to close ongoing psychometric scrutiny to protect against cultural bias. However, it is a common misunderstanding that an instrument can be objectively validated and thus bear good psychometric properties for diverse contexts (Brodin 2014). Thus, psychometric properties, such as validity, do not pertain to an instrument as such; rather, they are a feature of the construal of the results generated from a contextual study (Messick 1989). Therefore, when inventories are translated from a foreign language and/or applied to a different population, it

is an empirical question, and findings need to be psychometrically scrutinized for the population in question. Otherwise, "It would be like visual observation using eyeglasses borrowed from someone else. It is bound to produce unclear or suboptimal results" (Sijtsma & Molenaar 2002:5).

Most studies exploring the psychometric properties and scale structure of the DREEM have predominantly applied methods derived from classical test theory (CTT), such as factor analysis and/or principal component analysis. These methods rest on the assumption of continuous data and a normal distribution of data. They mainly investigate the relationship between items and total scale scores and have been demonstrated as providing a limited insight into the dimensionality of a scale (van Schuur 2003). An alternative method to CTT is item response theory (IRT), which pursues much of the same problems as CTT and was developed particularly for nominal and ordinal questionnaire data. One branch of the IRT method is the Mokken scale analysis (MSA), which is based on the principles of IRT and a scaling method proven to be valuable for assessing the psychometric properties of questionnaire data (Sijtsma & Molenaar 2002; Stochl et al. 2012; Van der Ark 2012).

The MSA is a data reduction method aimed at assessing unidimensional scales of dichotomous (binary) or polytomous (ordinal) items and belongs to the class of non-parametric item response theory (NIRT). MSA can be applied when designing or constructing multi-item questionnaires; as a secondary analysis to more well-established CTT or parametric IRT methods (PIRT); or to explore the conformity of new data in which established items are applied to new respondent samples (Stochl et al. 2012). MSA also has some advantages over PIRT models, such as the Rasch model. First, MSA is based on less restrictive assumptions and is less demanding on the data while maintaining important measurement properties, which prevents researchers from unnecessarily removing items from a scale. Second, MSA provides useful tools for exploratory dimensionality analyses that are not readily available for PIRT models (Emons et al. 2012). Recently, Vaughan et al. (2014a) employed PIRT models, employing a Rasch analysis of the DREEM in a sample of osteopathic students in Australia. However, I concur with Brodin (2014:9) that before assessing the possibility of using a sum score as a "sufficient statistics to establish a reasonable 'person measure' on an interval scale, an initial step would be to gauge data by means of a non-parametric approach."

Gauging environments in clinical education

The following paragraphs describe the literature on measures developed for the clinical environment. Although this thesis is limited to an instrument that primarily measures the formal and non-clinical environment, the instruments presented below are of interest as they provide a broader perspective of the investigated phenomenon and complement the latter parts of the thesis.

Only a few instruments have been developed to specifically assess students' perceptions of the clinical educational environment. Roff et al. (2005) constructed the Postgraduate Hospital Educational Environment Measure (PHEEM), the most widely used instrument (Colbert-Getz et al. 2014). It is a 40-item survey that assesses the metrics of issues relating to the clinical educational environment, such as the level of autonomy, the quality of teaching, and social

support during the hospital-based training period. The PHEEM can be used to identify the strengths and weaknesses of a medical residency program and has been reported to be a reliable and consistent tool to assess the clinical environment (Vieira 2008). The Dutch Residency Educational Climate Test (D-RECT) was developed by Boor and colleagues (2011) and consists of 50 items and 11 subscales. The instrument touches on important issues such as supervision, coaching and assessment, and feedback. The D-RECT also includes less obvious themes such as professional relations between attendings and patient handover. Despite the fact that the D-RECT has displayed all-encompassing and very strong psychometric characteristics, it has scarcely been used (Colbert-Getz et al. 2014). Strand et al. (2013) recently developed the Undergraduate Clinical Education Environment Measure (UCEEM), a valid, reliable, and feasible multidimensional measure for evaluating the clinical workplace as a learning environment for undergraduate medical students. The UCCEM is a 25-item instrument with two underlying dimensions – experiential learning and social participation – and four subscales: opportunities to learn in and through work and quality of supervision; preparedness for student entry; workplace interaction patterns and student inclusion; and equal treatment.

Among healthcare professions, nurse educators have also given thorough consideration to gauging perceptions of the clinical environment. Callaghan and McLafferty (1997) investigated ways to make the most of the learning environment of student nurses and sought to develop an audit tool for learning in the clinical practice setting. Chan (2001, 2002) created an instrument to assess nurses' perceptions of the hospital as a learning environment. Lastly, a widely used instrument, particularly in the context of the Nordic countries, is the Clinical Learning Environment, Supervision, and Nurse Teacher scale (CLES+T) developed by Saarikoski and Leino-Kilpi (2002). It was developed to measure student nurses' perceptions of learning on the ward.

Qualitative approaches

The use of instruments in inquiries about the educational environment can provide useful information about different stakeholders' perceptions. However, this can be multifarious because of the risk of excluding central elements, thus offering restricted acumen into the intricacies of the phenomenon (Snadden 2006). Instrument-driven scholarly investigations often conclude with calls for qualitative explorations and inductive approaches aimed at generating a deeper understanding of educational environments (Boor 2009; Demiroren et al. 2008; Whittle et al. 2007).

In this following section, I make an unassertive effort to highlight differences between the ideas behind perceptions and conceptions, demarcating how these notions are used in the present thesis. Notwithstanding, there is a substantial literature on the distinction between these two concepts (e.g., Bueno 2013; Dilworth 2013; Smith 2005). Strand et al. (2015) have also recently highlighted a difference between the terms perception and conception (and also discuss the concept of understanding) and that they are used with diverse connotations in empirical investigations, depending on the field of scientific inquiry (such as philosophy, psychology, or education) and the research approach employed (such as quantitative or qualitative). In this thesis, I make use of "to perceive" as to become aware of something through the senses and "to conceive" as shaping and forming something in the mind or

developing an understanding. Bueno (2013) has suggested that perceptions can organize a phenomenon in structured ways while conceptions can further lead to a reinterpretation of perceptual experiences.

Thus, in this piece of scholarly work, I look upon perceptions as more "shallow" interpretations whilst conceptions are viewed as more creative interpretations involving extensively more thought or imagination. Consequently, I would argue that perceptions can likely be quantified through the use of instruments, however, quantifying conceptions is more daunting. Even though conception is not explicitly addressed in the thesis, conceptualization is, and it is regarded as the process of forming a conceptual model of the phenomenon to underscore the notion of a more profound interpretation of the meaning of the educational environment.

Conversely, the notion of people's lived experience is deeply rooted in qualitative methods and methodologies of inquiry beyond those of the post-positivist paradigm. Since naturalistic inquiry does not aim to enumerate, but rather develops concepts that can help us understand social phenomena in natural settings, it places emphasis on the meanings, experiences, and views of those inquired (Mays & Pope 1995). According to Patton (2002), questions about people's experiences, inquiry into the meanings people make of their experiences, as well as studying a person in the context of his/her social and interpersonal environment are all central to inquiry into a phenomenon of interest.

I would argue from a pragmatic stance that instrumentally-driven research often targets the measuring of perceptions and attitudes to different phenomena. However, inquiring into conceptualizations and experiences presents difficulties in relation to quantifying, which could be illuminated by exploring and interacting with the phenomenon through reflection and dialogue.

Exploring environments in formal and clinical education

Investigating educational members' experiences, such as students' and teachers' experiences of the environment (i.e., a qualitative approach) can provide new perspectives that can be difficult to detect using a mono-method approach. Empirical studies using (a blend of quantitative and) qualitative approaches to explore the educational environment are not as abundant as the above-described research method, and most of these studies have only been published in the last decade. However, in the sphere of naturalistic inquiry, the clinical aspect of the educational environment has been prevalent in existing studies and particularly within nursing education. More recently, however, while medical students have been studied more intensively, other healthcare professions have scarcely been investigated.

In nursing education, the prevailing focus has been on "good" versus "bad" clinical environments. Empirical findings have indicated that belongingness is important, that the relation between formal and clinical education is vital, that students should be given the opportunity to take responsibility and be autonomous by performing patient-centered care, and that the student-supervisor relationship should be at the forefront (Hegenbarth et al. 2015; Jonsén et al. 2013; Levett-Jones & Lathlean 2008; Löfmark & Wikblad 2001; Manninen et al. 2013; Papp et al. 2003).

In an ethnographic study, Seabrook (2004) elicited medical students' experiences immediately after their first clinical encounters and observed their striving "to fit in" alongside feelings of being "in the way." Liljedahl et al. (2015) contrasted medical and nursing students' experiences of the clinical learning environment and highlighted differences in approaches to learning as well as in the enculturation of the two professions. Other scholars have highlighted the chaotic environment that students and residents face in clinical contexts when coalescing working with learning (Cross et al. 2006; Hoffman & Donaldson 2004). Using a multi-method case study, Boor and colleagues (2008) reported important aspects relating to the manner in which the clinical environment is shaped. They concluded that differences between different environments appear to be related to differing approaches to participation and that participation depends on the characteristics of the clinical context and the students as well as the interactions among them.

With regard to medical students, the research literature has acknowledged the challenges relating to the clinical environment, which have been well documented (Boor et al. 2008; Roff et al. 2005; Strand et al. 2013). However, this issue has often been investigated primarily with the use of the concept of learning and the workplace environment. Learning in a workplace environment includes well-recognized learning outcomes like knowledge, skills, and attitudes, although they are contextualized and individual. Scholars have pointed out that this environment includes the acquisition of learning skills, which enable students to be effective workplace learners (Dornan et al. 2007; Stok-Koch et al. 2007). In a review article, Dornan and colleagues (2014) reported that students reached a variety of learning outcomes when they were supported emotionally, pedagogically, and organizationally. Karani et al. (2014) reported on the role of residents in the workplace education of medical students and highlighted role-modeling, a focus on teaching and creating safe learning settings, supporting experiential learning opportunities, contributing feedback, and stimulating learning. Strand and collaborators (2015) recently underlined that medical students' workplace learning systems should be thought of as processes of reciprocity between contextual factors and student-supervisor agency and that clinical workplaces were either conceptualized as a context in which students learn or as an interim source of knowledge within an educational curriculum.

However, despite the range of studies outlined above, very few investigations have endeavored to explore and deepen the understanding of the formal educational environment or the environment as all-encompassing, including both the formal and clinical aspects. Cleave-Hogg and Rothman (1991) investigated the effects of the characteristics of the educational environment on medical students' approaches to learning and revealed that virtuous student-teacher relationships could negate factors that hinder learning, such as a highly competitive educational environment. Kendall et al. (2005) noted that dissatisfaction among graduate medical students was expressed in the discrepancies between formal and informal environments by means of teaching and learning opportunities. According to them, factors contributing to a good environment include feeling valued, being supported but not overly supported, having a clear understanding of the role of the teacher/supervisor, and being given space and opportunities for development.

Furthermore, as mentioned earlier in this chapter, there is proximity between the contiguous phenomenon of the educational environment and the hidden curriculum (Genn 2001b,

2001a). Some of the empirical studies in the scientific literature have explored the hidden curriculum, usually with negative connotations and the more negative aspects of educational experience. Lempp and Seal (2004) observed that medical students experienced overt examples of teachers as positive role models; however, valued characteristics were perceived in the context of traditional gendered stereotypes. They also described a hierarchical and competitive environment in which haphazard teaching by humiliation occurred, especially during the clinical training periods. Elements of the hidden curriculum have also been jointly explored among medical students and staff. Mossop and colleagues (2013) reported these elements as: core assumptions, rituals, routines, control systems, organizational issues, and power structures. Concurring with Hafler et al. (2011), whereas healthcare professional educators and others tend to view or describe the environment as a simple dichotomy between the formal and hidden curriculum, social learning in an educational context is a far more complex phenomenon.

In short, these aforementioned empirical studies offer some insight into exploring formal and clinical educational environments, and one can generally acknowledge the dearth of research on environments employing methodologies beyond those of the post-positivist paradigm.

UNIQUENESS OF TWO CASES

In the Swedish healthcare system, there are twenty-one professions that meet the requirements for a state governed license to practice. Three of these professions have a primary focus on musculoskeletal problems and disorders – physiotherapists, chiropractors, and naprapaths – and are eligible for a professional status qualification by means of a protected professional title and license to practice issued by the Swedish National Board of Health and Welfare. The latter group will not be discussed further as it is not within the scope of this thesis. Chiropractic and physiotherapy have so far been two distinct professions, but while physiotherapy has been incorporated into public universities since the 1970s, chiropractic education has been allocated to a private university college outside the domain of public funded education (Häger-Ross & Sundelin 2007). In 2009 the government commissioned the Swedish Higher Education Authority and Swedish Council for Higher Education to prepare a proposal on how the education of chiropractors could be designed within public funded university programs with regard to the scope, content, and level of academic placement (Högskoleverket 2010). As outlined in the prologue of this thesis, the proposal was presented in 2010 and recommended that the chiropractic program become a master's program in specialist education after undergraduate training as a registered physiotherapist (Högskoleverket 2010). Should this government proposal materialize, this would create a unique educational program in which two former separate healthcare professional educational programs would be integrated under one common undergraduate public funded university program.

Chiropractic and physiotherapy are in some ways analogues: many of the subjects studied at the undergraduate level are the same or very similar (e.g., anatomy, physiology, medical sciences, scientific methodology, and vocational specific subjects), even though the amount of time devoted to some subjects differs. There are also many elements in the clinical examination and treatment and rehabilitation regimes of patients that are comparable in both programs. Further, the two healthcare professional training programs educate their future

professionals to engage and take responsibility for similar patient cohorts. Conversely, there are also vast differences due to different contextual educational settings. Future chiropractors undergo training from a solitary, small-scale educational provider outside the traditional academic and state funded university system. Conversely, physiotherapists are part of large established state funded universities and their programs provided at eight different universities across the country.

The proposal to merge the two formerly separated professional groups raises many interesting questions regarding contextual reciprocities and coherencies but also differences and incongruences in healthcare professional education. Within the scope of this research project, particularly interesting questions that emerge are of course those of the educational environment and how we can better understand the phenomenon of the educational environment. Thus, the current thesis provides a unique opportunity through two distinct cases to study the educational environment within two educational programs with many common attributes as well as many inherent differences.

RATIONALE OF THE THESIS

There has been a worldwide increase in the awareness of the environment in healthcare professional education. In this thesis, the notion of the educational environment was investigated with a series of studies in a European Nordic country context, which has been under-represented in the existing research literature. The prevailing empirical and theoretical literature on these environments indicates that this phenomenon is a multifaceted area of research. Exploring educational environments can be intricate as they encompass a multitude of settings, features, and stakeholders. While the existing literature describes the importance of the educational environment, it often lacks comprehensive explanation of the concept and what constitutes such environments. Although the concept of the educational environment is frequently used in different forms, its use, along with its all-embracing nature, has been criticized, and attention has been called to the fact that the concept is rarely well defined and demarcated and that a clear definition remains elusive.

Various instruments have been used to measure the environment in professional healthcare education, each with its inherent pros and cons. However, there is a paucity of empirical investigations on changes in the educational environment over time. Quantitative introspections can provide useful information about stakeholder' perceptions, but they offer restricted insight into the intricacies and multifariousness of educational environments as they risk excluding certain fundamental and explicit elements. Instruments merely create a snapshot of perceptions or attitudes and cannot provide data regarding the concerns underlying poor scores or other constructs that are not encompassed therein. Thus, there should be increased focus on explorations aimed at generating a deeper understanding of the educational environment both as a concept and a context.

Despite the large number of studies utilizing instruments, such as DREEM, to explore stakeholders' perceptions of their higher educational environment, very few psychometric reports have been published. Reproductions of a priori scale structures have been moderately successful, and some contradictory evidence exists in the scholarly literature regarding the psychometric properties of instruments used to gauge educational environments. To reduce

this gap in the existing knowledge, instruments, when applied to new and different populations, require constant scrutiny and evaluation in relation to their psychometric quality, including the incorporation of validity and reliability. Exploring the psychometric properties of the DREEM may help to better understand some of its strength and weaknesses and to make better judgments of the tool to assess the educational environment in a specific context.

Attention has been drawn to the paucity of studies investigating teachers' perspectives on the environment. It is reasonable to assume that successful environments would benefit from greater understanding as they are experienced by stakeholders within their working environment. Because of the reciprocity between teachers and students, teachers' perspectives are significant not only for themselves but also for students. To the best of my knowledge, there is a need for empirical research in which data from students' perceptions of the environment can be used as a trigger to illuminate beliefs among teachers, not to prove them wrong or right, but to subject them to refutation and to explore conceptual ideas and possible interpretations of the perceived phenomenon.

Lastly, several healthcare professions, such as medicine, dentistry, and nursing, have done a great degree of empirical investigation – both quantitative and qualitative – regarding educational environments; however, others have done much less. Two scarcely researched environments are chiropractic and physiotherapy education, and the distinctions between these vocations are an important consideration in an inquiry into these two very different cases. More profound knowledge in this area can be of practical use for politicians, educational institutions, and educational leaders when developing, integrating and effectuating new and existing healthcare professional educational programs in the future.

3 AIM

The overall aim of this thesis was to provide a deeper understanding of the phenomenon of the educational environment in healthcare professional education. More specifically, to explore what constitutes educational environments and what it means in the context of chiropractic and physiotherapy undergraduate education from two complementary perspectives:

- A student perspective
- A teacher perspective

To achieve the overall aim of the thesis, the specific objectives were:

I. To explore areas of strength and weakness in the educational environment as perceived by undergraduate physiotherapy students and to investigate these in relation to the respondents' demographic characteristics.

II. To compare the perceived educational environment among undergraduate chiropractic students at two different points in time and to longitudinally examine potential changes in the perceptions of the educational environment over time.

III. To investigate the psychometric properties of the Swedish version of the DREEM in a sample of undergraduate physiotherapy students by employing a non-parametric approach of item response theory.

IV. To explore undergraduate chiropractic students' experiences of the meaning of their educational environment.

V. To explore and contrast chiropractic and physiotherapy teachers' experiences and conceptualizations of the meaning of the educational environment.

4 METHODOLOGY

A distinction is made in this thesis between the concepts of methodology and methods. Following Clough and Nutbrown (2012), methodology is here defined as the justification underpinning the decisions made about the investigated phenomenon; the particular research tradition within which I work; how I see the knowledge upon which I draw; the delimitations; the relational and ethical concerns; and the manner in which the findings are epitomized. In other words, methodology relates to the core principles that have guided my research. Shaped by the methodology, methods relate to the research tools, techniques, and processes used in the research. Thus, the first part of this chapter takes a broader perspective and addresses the elemental methodological rationalizations underpinning this thesis while the subsequent part addresses the methods and materials employed in the empirical studies.

METHODOLOGICAL ASSUMPTIONS AND JUSTIFICATIONS

Figure 2 depicts a figurative conceptualization of the methodology used in this thesis. The inquiry of the phenomenon, the aligning of philosophical positioning, approach to inquiry and methodological framework, and the intricate relationship how theories are used, are evinced to assist the reader in this ensuing chapter.

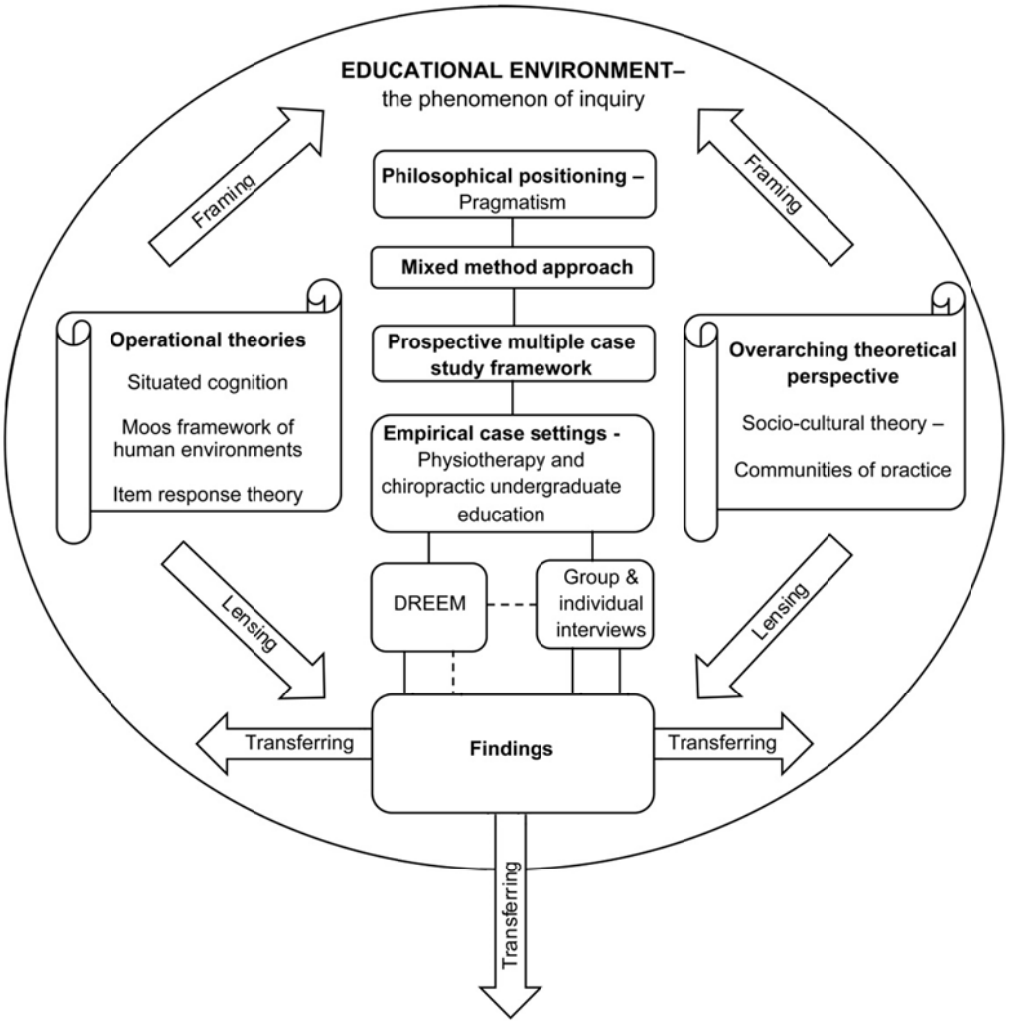

Figure 2. Methodological assumptions and theoretical stances.

Based on the theoretical perspectives described in Chapter 2 and depicted in the figure above (Figure 2), I draw upon the communities of practice framework as an overarching theoretical perspective in this thesis. Other theories such as situated cognition, Moos' framework of human environments, and item response theory are used primarily on an operational level. These selected theories (overarching and operational) adhere to the assumptions of my positioning, approach, and framework and are used as follows: *framing*) to delineate and scaffold the research problem and my phenomenon of interest; *lensing*) to act as a bifocal to further explore and understand my findings and to lever these findings and new knowledge on a wider level; and *transferring*) to demonstrate how my findings can be conveyed to similar contexts within the investigated phenomenon (represented by the arrows re-entering the sphere in Figure 2) or transferred to other closely related phenomena (represented by the arrow leaving the sphere in Figure 2), such as issues regarding hidden curricula, chilly climates, cultural identities, and educational hierarchies.

Below are the methodological assumptions and justifications subsumed under the terms philosophical positioning, methodological framework, and approach to inquiry.

Philosophical positioning

This project takes a philosophical position anchored in and drawing on some of the core tenets of pragmatism. Pragmatism as simply asking about "what works" has been a recurrent problem in scientific inquiry (Hildebrand 2008; Morgan 2014). In concurrence with Denscombe (2008), I argue that pragmatism is not an "anything is ok", chaotic, and unprincipled philosophy. Thus, a pragmatic stance (Patton 2002) – in the sense that the overarching intent shaping the idea of the project evolves from real-world settings and not from theoretical standpoints – aims to provide a deeper understanding and additional knowledge of the educational environment phenomenon for the purpose of improvement of these environments.

It is not exactly easy to deliver, in a single sweep, the main tenets of pragmatism as there are a myriad of depictions. This is not only true for pioneers in pragmatism such as Charles Sanders Peirce, William James, and John Dewey but, likewise, for more contemporary scholars and neopragmatists such as Richard Rorty, Robert Brandom and Susan Haack. Furthermore, pragmatism can be discoursed from many different standpoints. Hence, in this thesis, my pragmatist philosophical posturing stays close to the central ideas, different stands and conceptions of John Dewey, primarily as described by Hildebrand (2008). According to Hildebrand (2008), two beliefs are fundamental to Dewey. The first guiding belief concerns the approach or stance toward the activity of philosophy. Here, he urges a practical starting point, a bottom-up approach. The second guiding belief is his view that philosophical questions about knowledge and truth can never be separated from efforts to create and preserve value, frequently unified by Dewey's meliorism – i.e., the belief that life is neither perfectly good nor bad; it can be improved only through human effort.

The general and overall features of pragmatism are to find a center ground between philosophical dogmatism and skepticism – having risen as a rejection to these in the United States in the late nineteenth century – with the aim of finding a feasible resolution among long-standing philosophical antagonistic viewpoints (Johnson & Christensen 2012).

Pragmatists agree that no absolute connection between theoretical perspectives and data collection methods exists. Even though pragmatists recognize that theoretically stringent divisions of methods according to methodology seem logical, they argue in favor of using methods that are appropriate to the purpose of the research as a core tenet (Dahlgren et al. 2007).

Much of Dewey's philosophical thoughts and agenda are decidedly pertinent for this thesis, especially due to its design, because he pursued the dissolution of the dichotomy between realism and relativism. This disparity is closely related to the detachment between constructivism and post-positivism whereby the distinctions between these two major paradigms have been paramount in the quest of the philosophy of knowledge (Lincoln et al. 2011). Pragmatism discards the traditional philosophical dualisms and advocates more moderate, reasonable, and common sense versions of dualism based on how well a problem is solved (Morgan 2007, 2014). Dewey assumed that when we first are encountered with a problem, our main task is to recognize our problem through unfolding its elements and ascertaining their relations. So, by formulating a tangible question that we need to answer depicts that progress is ensued (Hildebrand 2008). Thus, the pragmatic paradigm recognizes the perseverance and significance of the natural or physical world alongside the evolving social and psychological world, including culture, language, and subjective thoughts. However, according to Dahlgren et al. (2007:43) "True pragmatists address the paradigm concerns and have theoretical reasons for combining methods."

Pragmatism assumes that there are no fixed answers to ontological questions, meaning that ordinary, mundane human experience is the closest we can get to reality. Thus, reality is relatively disparate for us all as we experience dissimilar events in life. In Dewey's pragmatism, experience is at the fore; thus, ontological controversies about both the nature of the exterior world or the realm of our conceptions are merely a two-sides-of-the-same-coin argument. However, even though my positioning in this thesis leans on pragmatism, with its inherent skepticism around the ontological question, it is common for mixed methodologists to continue to declare their view on reality (Johnson & Christensen 2012). The ongoing, decades-old scientific debates regarding paradigms (Guba 1990) have shaped a more refined and sophisticated understanding of the two leading paradigms – post-positivism and constructivism – with a priori different ontological and epistemological assumptions. Regrettably, the omission of pragmatism from that discourse has enduring implications for the tradition as a philosophical stance and system. In order to overcome this, I have chosen to be explicit about the ontology underpinning this project, which adheres to pluralism; hence, there is an appreciation of the objective, subjective, and inter-subjective realities and their interrelations.

However, pragmatism is, to a greater extent, more apprehensive of the epistemological than the ontological question (Morgan 2014). Truth and knowledge are rooted solely in attainable evidence at a specific time. Consequently, pragmatism believes that truth and knowledge are unavoidably, continuously partial and incomplete. Pragmatism views knowledge as being equally constructed and based on the reality of the world we experience and inhabit. It adopts a methodologically eclectic, pluralist attitude to research and endorses resilient and practical empiricism as a way to determine what works (Johnson & Christensen 2012). Thus, in this project, my epistemological standpoint is that knowledge is situated and socially dependent

and it is interpreted and negotiated, through a process of experience and reason. Moreover, action is brought to the fore in the overall aim and specific objectives of the thesis.

During a hefty part of my PhD education, I struggled to position myself on the traditional spectra of philosophical paradigms, but what directed me towards pragmatism was the freedom, the versatility, and its sanction of methodological and paradigmatic promiscuity. Figure 2, depicted above, illustrates how my philosophical stance within pragmatism and underlying assumptions have guided me toward a choice of methodological approach that has, to some extent, been the stepping stone on the path of my selection of methods.

Approach to inquiry

A mixed methods approach – with a multi-lens focus, including quantitative surveys, complemented with in-depth qualitative evaluations through group and individual interviews – was chosen. The pragmatic philosophical stance is well suited to underpin this approach (Cleland & Durning 2015). Some would argue that authentic mixed methods research can only be considered when different methods are used within a single piece of research, e.g., a scientific article. However, I argue, that this thesis and its overall aim, was best explored using a diverse scientific method in order to understand the phenomenon of interest. Bryman (2007) highlights that one feature of the mixed methods approach that distinguishes it from the mere collection of qualitative and quantitative data is that such the corresponding research must be presented and written up in such a way that both types of data are mutually illuminating. Further, and concurring with Tashakkori and Teddlie (2010), integration should be considered the primary criterion when opting for a mixed methods approach.

The use of mono-method approaches is sometimes advocated in some research traditions, and purists maintain that quantitative and qualitative approaches should not be used together because of differences and incongruences in their respective philosophical underpinnings (Guba & Lincoln 1989; Schwandt 2000). This either/or position is sometimes referred to as the incompatibility thesis (Johnson & Christensen 2012). However, the pragmatist perspective does not determine the methods used, the kinds of data, or the analytic outline, thereby remaining open to using different methods to achieve overall aims. Mixed methods research approaches support the idea of the compatibility thesis, which asserts that the two approaches can be used together so long as the assumptions associated with them are respected and construct a thoughtful combination that helps to address the research problem (Johnson & Onwuegbuzie 2004).

In line with Dewey's view (Hildebrand 2011), pragmatism outlines an approach to inquiry consisting of inductive discovery (induction) and deductive proof (deduction). Thus, it oscillates between data and theory and relies heavily on a version of abductive reasoning that moves back and forth between induction and deduction (Dahlgren et al. 2007). Consequently, in this thesis, I remain cognizant of the compatibility thesis, hence my familiarity with and embrace of both the traditional (post-positivistic) and interpretive research traditions and my application of both quantitative and qualitative data gathering techniques, as outlined in Figure 2 above.

Methodological framework

In this thesis, a multiple case-study methodological framework was employed within the aforementioned pragmatic worldview. Multiple case studies allow analyses within each setting as well as across settings and can enable us to understand and contrast similarities and differences between cases (Yin 2003). Thus, in this thesis, two different contextual educational settings that per se are difficult to compare comprises two suitable cases.

Case study research can be defined in many ways. Whilst Creswell (2013:73) defines it as "the study of an issue explored through one or more cases within a bounded system" (such as a class, a school, a community), others would not subscribe to such a stringent definition. For instance, Stake (1994:236), who sees case study research as being concerned with the complexity and the particular nature of the case in question, states that a "Case study is defined by individual cases, not by the methods of inquiry used." In this thesis, I was inspired primarily by Yin's (2014) conceptualizations and scholarly work on case study research. Yin (2014:16) defines a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real world context, especially when the boundaries between phenomenon and context may not be clearly evident." Yin (2014) further argues that a case study is a study of a case in a particular context, and when the border between the phenomenon and its context is faint, it is essential to set the case within its context using rich contextual descriptions and details. In Chapter 2, I try to entrench for this contextual case description, which is further designated in the latter part of this chapter more comprehensively. Thus, the phenomenon of the educational environment and its proximity, relation, and interaction with the contexts constituted a basis for the choice of a multiple case study methodology. As out lined in Figure 2 the methods are employed in two empirical case contexts. Although case study research is perhaps more common in the paradigm of qualitative research, this research approach embraces an all-inclusive method, meaning that a multitude of methods can be applied, thus being equally quantitative, qualitative, or composed of both (Hartley 2004; Yin 2003). Consequently, a case study cannot be delineated by its empirical methods, but preferably vis-à-vis its theoretical orientation and consideration in specific cases (Hartley 2004). I, further align myself with Johnson and Christensen's (2012) notion that scholars engaging in case study methodology tend to withhold a pragmatist view and advocate multiple methods and data sources.

Based on the aforementioned reasons and the uniqueness of this project, as outlined in the prelude and Chapter 2, the case study methodology further helped to delimitate the thesis. The two cases could reveal the unfolding of a possible new trans-professional identity, with inherent concerns regarding reciprocities, and the coherence of educational environments forming a unique and bounded multi-case. However, the thesis was further delimited by the choice of the problem itself, hence the conceptual framing through an alignment with the empirical and theoretical literature, together with the identification of a knowledge gap, as outlined in the preceding chapters. This consequently implies other related problems that could have been chosen but were screened out. Finally, the purpose statement – with its overall aim and specific objective – explains the intent, setting out the intended accomplishments, and includes an explicit understanding of what the study will not cover.

Different schools of case study methodologies have argued for and have their own view on the process of analysis (Merriam 1998; Stake 1994; Yin 2014). According to Yazan (2015) the different epistemological stances of the "case study schools" have impacted their approach to data analysis. Yin's (2014:132) description of analysis "consists of examining, categorizing, tabulating, testing, or otherwise recombining both quantitative and qualitative evidence to address the initial propositions of a study", which is companionable with Yin's favor for combining quantitative and qualitative research. Although, in this thesis I have chosen not to explicitly work in line with this type of analysis.

A common concern regarding case study research is the apparent inability to generalize from the corresponding findings (Tsang 2014). This issue is addressed in the penultimate part of this chapter. However, Flyvbjerg (2006) have emphasized, and I coincide, that the goal of case study research, and by extension this thesis, is to expand and develop theories, in case study research sometimes referred to as analytic generalizations, and not to extrapolate probabilities, e.g., statistical generalizations. In my opinion, and concurring with other scholars, case studies provide unique illustrations of real people in real situations, highlighting how different ideas and perspectives can fit together (Creswell 2013; Yin 2003; Yin 2014). Notwithstanding, I regard this case study methodology as a framework and was inspired by it; I do not reconcile myself as a conformist of its methodology. Yet, case studies align well with my assumptions as they acknowledge that there are several variables operating in a unique case; hence, capturing the implications of these variables necessitates many sources of evidence.

MATERIAL AND METHODS

This section addresses the methods and materials employed in the empirical studies that forms the core of the thesis

Research design

The general research design strategy of the thesis was inspired by a prospective mixed-methods multiple case study methodology. Five studies were comprehensively designed to correspond with the overall aim, thus, to provide a deeper understanding of the phenomenon of the educational environment in healthcare professional education and more specifically to explore what constitutes educational environments and what the environment means for students and teachers in chiropractic and physiotherapy undergraduate education.

Based on the philosophical positioning, approach to inquiry, and methodological framework underpinning this thesis, an explorative design was employed. My view of an explorative design accords with the ideas of Ringsted et al. (2011). Thus, the goal of the design relates to modelling by identifying, describing, and analyzing the underlying characteristics and mechanisms of the phenomenon. In this multiple case study, modelling refers to the exploration and analysis of bits and pieces of the investigated phenomenon – the educational environment – in two very different, though by many means similar, healthcare professions and how their respective environments are perceived and experienced by their stakeholders.

A summary of the study design employed and the methods used in the five studies is presented in Table 3 and is further described in the ensuing sections. The five studies should not be regarded as chronological and sequentially ordered but rather as holistic, integrated, and coinciding portrayals of the two cases.

Table 3. Schematic overview of the design in the five studies.

Study	Focus of inquiry	Study approach	Participants	Data collection	Data analysis
I	Perceptions	Mixed-method cross-sectional	Physiotherapy students (n = 222)	Questionnaire*	Descriptive and inferential statistics
				Open ended question	Manifest content analysis
II	Perceptions	Quantitative 2- time-point & longitudinal	Chiropractic students (n = 124, n = 127; n = 34)	Questionnaire*	Descriptive and inferential statistics
III	Dimensionality	Quantitative Psychometric	Physiotherapy students (n = 222)	Questionnaire*	Mokken scale analysis
IV	Experiences	Qualitative 2-time-point & longitudinal	Chiropractic students (n = 26)	Focus group discussions	Manifest and latent content analysis
V	Experiences & conceptualizations	Qualitative	Chiropractic & physiotherapy teachers (n = 14)	Semi-structured interviews	Manifest and latent content analysis

*This is an assertion constructed instrument, but questionnaire is here used in its broader sense.

Empirical case settings

The case study methodology used in this project was contextualized within two distinct empirical settings from where multiple-source data was collected: the chiropractic program at the Scandinavian College of Chiropractic (SCC) in Stockholm, Sweden, and the physiotherapist program at Karolinska Institutet, Stockholm, Sweden. Table 4 illustrates a summary of the two programs.

Table 4. Summary of characteristics of the two programs.

	Chiropractic program	Physiotherapy program
Setting	Foundation driven university college	Public funded medical university
Length (years)	5	3
Hours per week	40	40
ECTS	No	Yes
Degree	Professional qualification	Professional qualification and bachelor of science
Intake of students per year	45-60	120-150
Tuition fees	Yes	No
Government-funded student aid	Yes	Yes
License to practice	Upon completion of program and one additional year of internship in public healthcare	Upon completion of program

The SCC is a university college offering a five-year full-time (40 weeks per year) undergraduate program in chiropractic. By custom, at the SCC, the year of study (1 to 5) is used to designate the level of advancement and not term nomenclature. The SCC aims to offer a chiropractic education program based on modern medical science and the profession's best practices in clinical reasoning and chiropractic treatment principles, all with high demands of scientific evidence. Founded in 1983, the SCC has been run since 1992 by a charitable non-profit foundation. The training is under the supervision of the Swedish Higher Education Authority but has not been approved as a government-funded Higher Education College. Therefore, studies do not provide European Credit Transfer and Accumulation System (ECTS) academic credits, but the program equates to 300 ECTS. The training attracts tuition fees, but students can apply for government-funded student aid and a supplementary governmental loan for tuition fees. About 40–45% of the students are female; the mean age is around 25 years; and 20–25% of the student population is of ethnic background other than Swedish or Scandinavian (averaged data from 2010-2015). The program has one admission period a year, an academic start date in the autumn, and an intake of 45–60 students per year (SCC, personal communication, Stockholm, 14 October 2015).

The program content and structure are designed to give clinical experience from the inception through exposure to clinical cases and patient observations. The five-year training program comprises a large variety of courses, e.g., anatomy, physiology, neurology, orthopedics, nutrition, public health, and research methodology, with most courses given in Swedish. The purpose of the wide range of courses is to train chiropractors as primary healthcare providers concerned with the diagnosis, treatment, and prevention of disorders of the neuromusculoskeletal system. The courses are consecutively arranged and designed, and many courses have a strong emphasis on clinical relevance. The program (at the time of data collection) consists of a spiral curricular structure: it is divided into a conventional preclinical phase, focusing on basic and clinical sciences as well as theoretical and practical training in

traditional and formal classroom settings in the first three years and early clinical placements for a few days each semester. This is followed by two years of a clinical phase at the institution's outpatient clinic. The clinical phase is interwoven with formal theoretical education. The outpatient clinic provides students with the necessary knowledge, skills, and confidence to treat patients under supervision in a busy on-site, purpose built, state of the art clinic. During the clinical internship year, students refine their clinical skills and develop as a healthcare professional whilst gaining the necessary experience to be able to deliver the highest standards of care.

A blend of teaching and learning strategies is used. The teaching faculty in chiropractic is recruited from qualified and registered chiropractors in Sweden and from other internationally reputed schools around the world. Teachers of biomedical and medical specialty subjects come mainly from Karolinska Institutet and Karolinska University Hospital.

In the final year, the students execute a degree project spanning 10 weeks (equivalent to 15 ECTS). This research project is intended to encourage a scientific approach and scientific thinking and to deepen chiropractic as a research area. The project is carried out primarily in pairs under the supervision of a tutor. Tutoring is done individually or in groups. The project is examined at a project seminar through public discussion and examination.

The physiotherapy program is part of a publicly funded medical university, Karolinska Institutet (KI). KI is a mono-faculty university and offers the most extensive range of medical education under one roof in Sweden. The proximity between the Karolinska University Hospital and other teaching hospitals in the Stockholm area plays a significant role throughout the students' education. Whilst the SCC is a small-scale institution with around 225–300 students, KI is a large-scale medical university with approximately 6,000 undergraduate students taking educational and single subject courses at the bachelor's and master's levels.

The physiotherapy program at KI is an undergraduate program that culminates in a professional qualification and a bachelor of science degree in physiotherapy. The program has a three-year duration, which equals 180 ECTS (40 weeks per year), of which, courses in the main study field of physiotherapy make up more than half and correspond to the first Bologna cycle. The degree enables entry into the master's program, which corresponds to the second cycle of the Bologna process. The training attracts no tuition fees, and students can apply for government-funded student aid. There are two admission periods per year in the spring and autumn, respectively. In 2014, the program had 151 places for first-year students and 370 full-time equivalent students (Karolinska Institutet 2015).

The program, which is primarily delivered in Swedish, is organized into thematic areas comprising one or more courses and covers physiotherapy, anatomy, physiology, psychology, and numerous medical subjects. The courses and medical subjects aim for students to acquire a good overview and basic knowledge in the medical subjects that are important to the field of physiotherapy. The goal is for students to have knowledge of both medical indications and contraindications for physiotherapy intervention. The training introduces the early basics of scientific theories and methods, and students are trained in critical scrutiny in order to

promote the scientific approach and lay the basis for an evidence-based approach. The undergraduate training provides a foundation for further specialization within the specialist areas of physiotherapy.

The courses during the first year of study are mainly formal and are taught at the university campus. Field studies provide students with opportunities for contact with various professional physiotherapy contexts. The clinical courses are designated for terms 3, 4, 5, and 6 and are administered, in part, by the academic faculty, but mainly by adjunct clinical teachers (AKOR) and clinical supervisors. However, the former are connected to the educational program, and the latter have limited formal university connection, i.e., based on agreements between the health organizations and the university. Efforts have nonetheless been made to regularly invite the clinical supervisors for didactic teaching and discussions in the academic setting. The clinical training outside the university setting constitutes about one-fifth of the total education program and largely takes place in different parts of the Stockholm regional healthcare sector. During term 6, the students take two elective courses, one of which is the main subject of physiotherapy. Elective courses in physiotherapy can be partially clinical. In term 6, students write a degree project, bachelor's-level thesis, (15 ECTS) in pairs and under the supervision of a tutor. This is examined through public oral defense.

The entry qualifications and specific eligibility requirements for the two programs are the same and are based on national norms. However, admission to the physiotherapy program is more demanding due to its government-funded higher education status, with no tuition fees, thus making it a high-stake educational program. Admission to the physiotherapy program is based upon the applicant's upper secondary school qualifications (grade tariff) and the Swedish Scholastic Aptitude Test in the ratio 66% / 34%.

Both the chiropractic and physiotherapy programs include extensive clinical education in their curricula, and students can apply for a professional status qualification issued by the National Board of Health and Welfare upon completion of training. However, the process for this registration differs for chiropractic students as they require an additional one-year internship in public healthcare. For physiotherapy students, this can be applied for directly after graduation. The two professions are further protected by a professional title that may be used only by those who hold a license to practice.

Lastly, in healthcare professional education there are contextual and cultural differences regarding the usage and meaning of the term "undergraduate." In this thesis, undergraduate was defined as a program within the time frame of that leading to a professional qualification, thus three and five years for the physiotherapy and chiropractic programs, respectively.

Participants

This thesis primarily employed two different sampling strategies: convenience and purposive. Following discussions with a statistical consultant, it was decided that a probability sampling based on power calculations would be problematic in designing the thesis, hence the use of convenience sampling. This is a type of non-probability sampling that involves the sample being drawn from the part of the population that is close at hand. Due to the proximity of the two populations and the contexts of interests, this form of sampling was chosen. Hence,

convenience sampling strategies are useful ways of data gathering that would not have been possible using probability sampling techniques.

Purposeful sampling represents a group of diverse non-probability sampling techniques, sometimes also referred to as purposive, judgmental, or selective sampling. Purposeful sampling is extensively used in qualitative research to identify information-rich cases relating to the phenomenon of interest (Yin 2014). This approach increases the likelihood of participants providing rich and varied information relating to the phenomenon of interest (Creswell & Clark 2011; Patton 2002; Savin-Baden & Howell Major 2013).

Studies I and III

Non-probability convenience sampling was employed in *Studies I* and *III*. A total of 279 undergraduate physiotherapy students attending a traditional curriculum from terms 1–5 were invited to participate. Students attending an individually adapted curriculum or other curricula were excluded. Students in term 6 (the final term) were not included because they were on clinical placements and/or writing their degree project at the time of the data collection.

Study II

In Study II, from a total population of 318 undergraduate chiropractic students, a non-probability convenience sample of 149 students in 2009 and 169 students in 2012 (10 batches from years 1–5 in 2009 and 2012) was invited to participate. Thirty-four participants constituted a longitudinal sample and were available for follow-up; their scores from years 1 and 2 in 2009 were compared with those from years 4 and 5 in 2012. The study was limited to undergraduate students attending a traditional curriculum. Students following individually personalized and tailored curricular were excluded.

Study IV

To achieve variation and breadth in the data, a purposeful criterion sample was chosen (Patton 2002) based on the students' gender, year of class, and year (time point). Students were approached via mail by an administrative member of staff independent from the study, and all except one who declined due to time constraints accepted the invitation. So, twenty-six undergraduate students agreed to participate, 12 women and 14 men, with an age range of 18–29 years. The selected number of participants was within the acceptable norm for effective and meaningful focus group discussions (Krueger 1998; Krueger & Casey 2009). One group of participants (n = 6), three women and three men, which comprised the same group throughout the study, was interviewed at two different time points – in 2009 as year 1 students and in 2012 as year 4 students – assembling a somewhat longitudinal sample (Figure 3). The incentive for the qualitative exploration of these particular cohort years was derived from previous empirical findings.

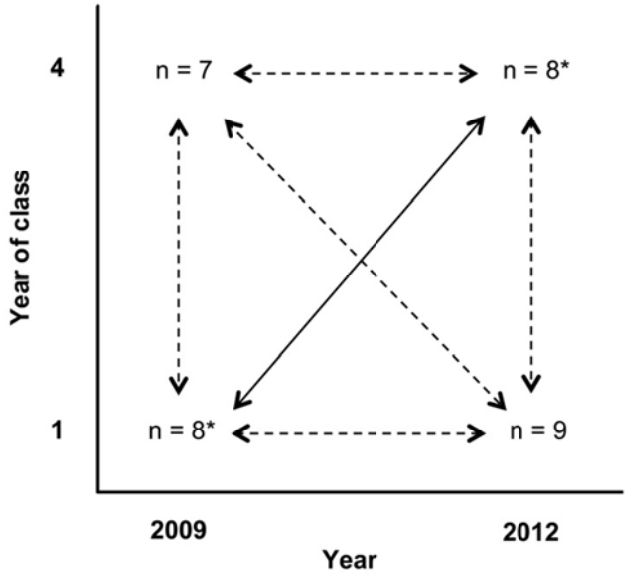

Figure 3. Participants and cross-contrasting of focus groups, with *denoting participants (n = 6) interviewed at two different time points.

Study V

A purposeful and maximum variation sampling strategy (Patton 2002) was employed to obtain breadth in the data. Sixteen to eighteen participants was considered a satisfactory sample size to get a sufficient and feasible amount of data (Guest et al. 2006; Patton 2002). The selection of the sample was executed in several steps and was attained through a kind of snowball sampling procedure, i.e., the directors of each program were asked to identify and propose a list of conceivable participants, thus acting as gatekeepers for the study, giving access to and facilitating the data collection.

A wide range of teachers was sought – constituting a diversity of participants regarding gender, age, and years of experience in both preclinical and clinical education – in order to obtain comprehensiveness in the data. Potential participants were asked to participate, with 14 agreeing. Three declined for either personal reasons or a heavy work load. Our sample constituted eight teachers from the chiropractic faculty (CPT), four females and four males, age ranging from 28 to 63, and six teachers from the physiotherapy faculty (PTT), four females and two males, aged between 31 and 62.

Data collection

The data collection process was guided by the overall aim and study-specific objectives of the thesis. The data for *Studies I, II,* and *III* was collected using a questionnaire, an assertion-constructed instrument; hence, "questionnaire" is here used in its broader sense. For *Studies IV* and *V*, group and individual interviews were conducted respectively.

Studies I, II, and III

As highlighted in earlier chapters, measurement of phenomena in healthcare professional education is not without its difficulties, and quantification of the educational environment is

no exception. When considering which instrument to select to measure the two contexts, it was important that quality and practicality be taken in to account. Data for the first three studies were retrieved by means of DREEM, a self-administered, closed-ended inventory relating to a variety of topics of direct pertinence to educational environments. From the scientific literature addressed in Chapter 2, it is possible to delineate a depiction of DREEM's strengths and weaknesses as a tool for measuring the undergraduate environment in healthcare professional education (Table 5).

Table 5. Summary of strength and weaknesses of the DREEM inventory.

Strengths	Weaknesses
Simple to administer – ideal for paper or electronic format	Some statements may be open to interpretation or culturally insensitive
Easy to score	Some statements may not be applicable within a problem orientated curriculum
Quick to complete (tick-box format) – less missing responses are more likely	Excluding certain important aspects
Originally reported good psychometric properties	Recently reported variability in psychometric properties
Widely used internationally	No guidelines for statistical inference
Designed to be pertinent cross-culturally	Vulnerable to over-interpretation depending on the robustness of methods for statistical inferences
Permits easy comparison between sub-populations and between sites	
Interpretation guidelines provided by constructors	
Ability to drive curriculum development	

Taking into account the relative merits of DREEM, it was felt to be the most appropriate measurement tool available. The instrument has been translated and validated for use in Swedish contexts among medical students (Edgren et al. 2010), and permission to use the inventory was attained. DREEM comprises 50 statements, scored from 0 to 4 using a 5-point Likert response scale: 0 = strongly disagree, 1 = disagree, 2 = unsure, 3 = agree, and 4 = strongly agree. Scores of 0 or 1 for a single item are considered negative, 3 or 4 as positive, and 2 delineates unsureness (McAleer & Roff 2002). Nine of the items are negative statements aimed at avoiding response bias and are thus scored in reverse.

The DREEM items can be analyzed on three levels: overall, pooled into five subscales, and individually. In this thesis, I view the three levels of analysis as varying depths of the educational environment, which are gauged by an instrument, i.e., on a macro, meso, and micro level. This nomenclature will be used primarily in Chapter 6 while discussing the emerged findings. The DREEM has an overall score of 200, and the interpretation guidelines provided by the originators was followed, McAleer and Roff (2002). A global score of 100 can be considered "neutral" as it equates to an average score of 2 per item. A score greater than 150, can be considered "very good" as it conveys an average of more than 3 per item (Table 6).

Table 6. Guide for interpretations of DREEM overall scores.

Score	% of score	Interpretation
0-50	0–25	Very poor environment
51-100	26–50	Plenty of problems in the environment
101-150	51–75	More positive than negative environment
151-200	76–100	Excellent environment

The fifty items are combined a priori onto five subscales and can be interpreted against standard guidelines, as proposed by McAleer and Roff (2002), with cut-off points determined by deducing accumulated 0–4 scores (Table 6).

Table 7. Guide for interpretations of DREEM subscale scores.

Subscale	Acronym	Score	Interpretation
Students' Perception of Learning (12 items)	SPL	0-12	Very poor
		13-24	Teaching is viewed negatively
		25-36	A more positive approach
		37-48	Teaching highly thought of
Students' Perception of Teachers (11 items)	SPT	0-11	Abysmal
		12-22	In need of some retraining
		23-33	Moving in the right direction
		34-44	Model teachers
Students' Academic Self-Perception (8 items)	SASP	0-8	Feeling of total failure
		9-16	Many negative aspects
		17-24	Feeling more on the positive side
		25-32	Confident
Students' Perception of Atmosphere (12 items)	SPA	0-12	A terrible environment
		13-24	There are many issues that need changing
		25-36	A more positive atmosphere
		37-48	A good feeling overall
Students' Social Self-Perception (7 items)	SSSP	0-7	Miserable
		8-14	Not a nice place
		15-21	Not too bad
		22-28	Very good socially

On an individual item level, scores can be scrutinized to pinpoint strengths and shortcomings. Thus, items with mean scores greater than 3.5 mainly represent strong areas; items with mean scores of less than or equal to 2 should be inspected more meticulously as they indicate problematic areas; and items with mean scores between 2 and 3 indicate areas that could be enhanced (Roff et al. 2001; Roff. et al. 1997).

The inventory concludes with an open-ended question offering the respondents an opportunity to come up with their own responses. This question was phrased as follows: "Are there any other factors that you feel have an influence on the educational environment?"

DREEM was administered to physiotherapy students at KI in late autumn 2012 and early spring 2013 (*Study I* and *III*). The data was collected in a paper-and-pencil version and at the end of formal lectures to ensure a high participation rate. However, a web-based version was subsequently disseminated to allow more students to participate and to improve the response rate. Similarly, in *Study II* data was collected in the autumn of 2012 for chiropractic students at the SCC. A member of staff not related to the study distributed the inventory after class. Pre-existing data from 2009, which was collected in a similar fashion as the aforementioned, was used to explore a temporal and longitudinal course of perceptions of the educational environment. It differed from the former only on the basis that collection took place once and with no subsequent dissemination of a web version of the inventory (Palmgren & Chandratilake 2011).

Study IV

Four focus group interviews were conducted for *Study IV*, two during the spring terms of 2009 and 2012, respectively, with separate interviews held for students from years 1 and 4.

The choice of focus group interviews as a method was founded on the premise of promoting interaction, different viewpoints, and dialogue (Kvale 2009; Patton 2002). An interview guide was developed to navigate discussions and mainly included questions relating to the five DREEM subscales, which were considered germane. A pilot interview was conducted to test the interview guide. Adopting the method outlined by Krueger (1998), the overall interview structure was compiled using a series of carefully planned, introductory, transitional, key, and ending questions phrased in a conversational manner.

The interviews were held directly after lectures or clinical teaching and were conducted in a meeting room at the SCC. A relaxed atmosphere was sought, and all participants were encouraged to contribute. The audio-taped group sessions were transcribed verbatim by someone independent from the study. The principal investigator served as the moderator, and each focus group lasted 75–90 minutes, yielding five and a half hours of recorded material.

Study V

The data for *Study V* was collected in early spring 2015, through 14 face-to-face semi-structured, individual interviews to capture the teachers' experiences and conceptions (Kvale 2009; Patton 2002; Strand et al. 2015). An interview guide was constructed on the basis of two criteria: to correspond to the purpose of the study and, based on empirical findings from the literature, to highlight potential challenges in the educational environment. The interview guide was discussed in the research group until a consensus was reached. The physiotherapy teachers were interviewed by me, and a co-author interviewed the chiropractic teachers. This strategy was endorsed due to my teaching positioning in the chiropractic program. An assumption was made that interviewer and interviewees of the same profession would decrease the depth of the interview and possible pre-understandings clouding the data.

The interviews were conducted in meeting rooms at the SCC and KI, each lasting 25–75 minutes. The audio-taped interviews yielded 11 hours of recorded material, which was transcribed verbatim by someone independent from the study.

Data analysis

Study I

The data was subjected to descriptive and inferential statistical analysis. As nine items (4, 8, 9, 17, 25, 35, 39, 48, and 50) are negatively stated, corrections were made, thus resulting in higher scores designating disagreement with these items.

Overall, the subscale and individual scores were analyzed if all the items were completed by the respondents. Normal data distribution was assessed visually via boxplots by contrasting possible discrepancies among the parameters of central tendency, evaluating the skewness and kurtosis of the distributions and employing Kolmogorov-Smirnov and Shapiro-Wilk tests. The criterion variables were the perceptions of the educational environment as measured by the overall, subscale, and individual scores of the DREEM inventory. The main predictor variables were term, gender, age, immigrant background (based on parents' background), re-sitting exams, previous experience of higher education studies, and intent upon degree completion. Cronbach's alpha was employed to assess the internal consistency

of the overall and subscale scores of the instrument, and a minimum coefficient alpha of 0.70 was used to indicate an adequate level of consistency (Nunnally 1978).

Although the constructors of the DREEM instrument provide guidelines (McAleer & Roff 2002) for its interpretation, they do not recommend appropriate methods for statistical inferences. Non-parametric statistical tests were performed to avoid influences of the distribution of the data. The Wilcoxon-Mann-Whitney test was used for ordinal data while the chi-square test was used to compare nominal data. The Kruskal-Wallis test was used for independent between-group analyses. P-values were adjusted for multiple comparisons by employing the Bonferroni correction of primary endpoints. Pearson's correlation coefficients were used to analyze correlations between the subscales. Probability values less than 0.05 were considered statistically significant for all statistical tests.

Responses to the open-ended question were transcribed verbatim, and the transcripts were examined line by line. Significant sentences were identified, and central concepts were inductively grouped into emerging themes through a manifest content analysis by using an iterative process of going back and forth among original transcripts, significant sentences, and themes (Graneheim & Lundman 2004). The themes were discussed among the investigators until a consensus was reached.

Study II

The data in *Study II* was treated similarly to that of *Study I* in the initial phase of the analysis, e.g. introspection of data distribution and analysis of internal consistency.

The items were analyzed on three levels – overall, pooled, and individually – and only if all items were completed by the respondents. However, the main focus of the analysis in this study was the individual item level. The data from all levels were reported as averages through means. The overall and subscale scores were expressed as percentages of the respective maximal attainable scores. The criterion variables were the perceptions of the educational environment, as measured by the overall, subscale, and individual scores of the inventory, and the predictor variables were the cohorts' year (2009 and 2012) and year of study (1 to 5). Similar to *Study I*, the statistical guidelines and suggestions outlined by Swift et al. (2013) were adhered to, thus trichotomizing the five response categories into: agree/strongly agree, unsure, and disagree/strongly disagree. This strategy was employed as skewed distributions commonly occur in DREEM data and an item with a tolerable central measure may still disguise a high proportion of negative responses. Consequently, the method outlined by Swift and co-workers (2013) summarizes the responses by merging the categories and reporting the mean, with a series of "red flags", thresholds for proportional differences as well as means below a particular a priori determined level. However, the authors did not report the procedure for negative stated items. Hence, in Table 8, the recommendations provided by Swift et al. (2013), together with a strategy adapted for reversed items, is further illuminated.

Table 8. DREEM items type, phraseology, scoring and indication of problematic areas.

Type	Phraseology	Score	Indicating problematic areas*
Normal	"The teachers are knowledgeable"	Strongly Agree = 4 Agree = 3 Unsure = 2 Disagree = 1 Strongly Disagree = 0	Score ≤ 2 *and/or* < 50% Agree/Strongly Agree, > 30% Unsure, and > 20% Disagree/Strongly Disagree
Reversed	"The teaching overemphasizes factual learning"	Strongly Agree = 0 Agree = 1 Unsure = 2 Disagree = 3 Strongly Disagree = 4	Score ≤ 2 *and/or* > 20% Agree/Strongly Agree, > 30% Unsure, and < 50% Disagree/Strongly Disagree

*Interpretation of indicated problematic areas as outlined by Swift et al. (2013).

As in *Study I*, this study also employed non-parametric statistical tests, designated to evade influences of the distribution of the data. To compare two independent samples, the differences were calculated using the Wilcoxon-Mann-Whitney test. The chi-square test was used to test the proportions of clusters (agree/strongly agree, unsure, and disagree/strongly disagree) if the observed proportions were five percent or more in both clusters. To compare two matched samples, the Wilcoxon signed-rank test was employed. For the proportions of clusters in the matched samples, an akin type of analysis (as stated above) was performed, thus replacing the chi-squared test with the McNemar test of equal proportions. For both the two independent and two matched-samples groups, comparisons were made for each individual item.

Regarding the overall and subscale scores, the main focus of the analysis was to compare the DREEM scores between the cohorts' year and year of study. As there is no non-parametric equivalence to a two-way ANOVA, the Mann-Whitney U test we employed for independence between group analyses and the Wilcoxon signed-rank test for the matched-samples analyses. These tests were repeated five times. Due to multiple comparisons, a reduced p-value of 0.01 was used by employing the Bonferroni correction of primary endpoints to control for the risk of mass significance (Bland & Altman 1995). In all other circumstances, probability values of less than 0.05 were considered statistically significant.

In contrast to *Study I*, the data was subjected to further analysis, calculating the effect size by dividing the mean of the change scores by the pooled standard deviation. Effect size statistics of less than 0.2 indicated a small meaningful magnitude of change, 0.2–0.7, a moderate change, and >0.7, a large change. These analyses were performed for all three analytical levels.

Study III

At the beginning of the 1970s, Robert Mokken put forward two NIRT models for dichotomous items (Mokken 1971): the monotone homogeneity model (MHM) and the double monotonicity model (DMM) to underpin MSA, a scaling technique for ordinal data. Nearly ten years later, Molenaar (1982) developed these models to cater for polytomous items (more comprehensive discussions of these models can be found in Sijtsma & Molenaar (2002); Sijtsma and Meijer (2007); Wismeijer et al. (2008).

The MSA can be applied in a confirmatory manner, for a set of items that are assumed to form a scale, or in an exploratory manner when a set of items is analyzed to ascertain whether it constitutes one or more scales. Both confirmatory and exploratory approaches employ the same criteria, the only differences being what is entered into the analysis and the assessment of whether the clusters of items (dimensions), which are found or tested, adhere to one or two NIRT models. These models are grounded on four assumptions that must be met in order to permit and specify Mokken modeling. These assumptions are: unidimensionality, monotonicity, local independence, and invariant item ordering (IIO) (Sijtsma et al. 2011; Van der Ark 2012).

The assumption of unidimensionality means that for those items forming a scale, there is a dominant single latent trait (denoted as θ) that determines the answers to the items (Hulin et al. 1983). Unidimensionality is generally considered a desirable measurement property because it simplifies the interpretation of answers to the items and averts the total score of the items from expressing a potpourri of different traits. However, unidimensionality does not mean that it is impossible for more than one dimension to exist in a large set of items; rather, clusters of items fitting an NIRT model are unidimensional. The second assumption, monotonicity, refers to the increasing probability of the score on an item increasing as the level of the latent trait increases; thus, the endorsed response Pi (θ) is a monotonically non-decreasing function of the latent trait θ. Deviations from this supposition signal violations of monotonicity and possible distortions from an ordinal scale for measuring persons. Local independence stipulates that a person's responses to items on a scale are reliant on the respondent's level on the latent trait being measured; the response to one item is not influenced by the score on another (Nunnally 1978). It should be emphasized that this is largely an assumption as complete local stochastic independence is quite difficult to detect and very hard to achieve (Stochl et al. 2012; Watson et al. 2012). Lastly, the assumption of IIO refers to items on a scale with the same level of "difficulty" in terms of ordering across all respondents at all levels of the latent trait. The IIO property is decisive in establishing hierarchical scales. If these four assumptions are not excessively violated, higher sum scores are seen as corresponding to higher values on the latent trait, suggesting that respondents can be reliably ordered on the latent trait by their sum scores. By retaining a "bottom up" clustering technique by means of preselected cutoff values for item scalability, the MSA permits analyses of the dimensional structure of a scale or scales on different hierarchical levels (Friedrich et al. 2015; Watson et al. 2012).

Statistical procedure

Inventories containing "no response" to any item were discarded from the analyses as the MSA focuses on the multiple and partial correlation (relationship) between items. No imputations were performed as empty cells signify "no response" rather than "missing data," and no collapsing of the categories was performed.

The MSA incorporated several steps: Despite the fact that the ensuing steps might seem consecutively ordered, the analysis was in no way linear but rather iterative and recursive (Figure 4).

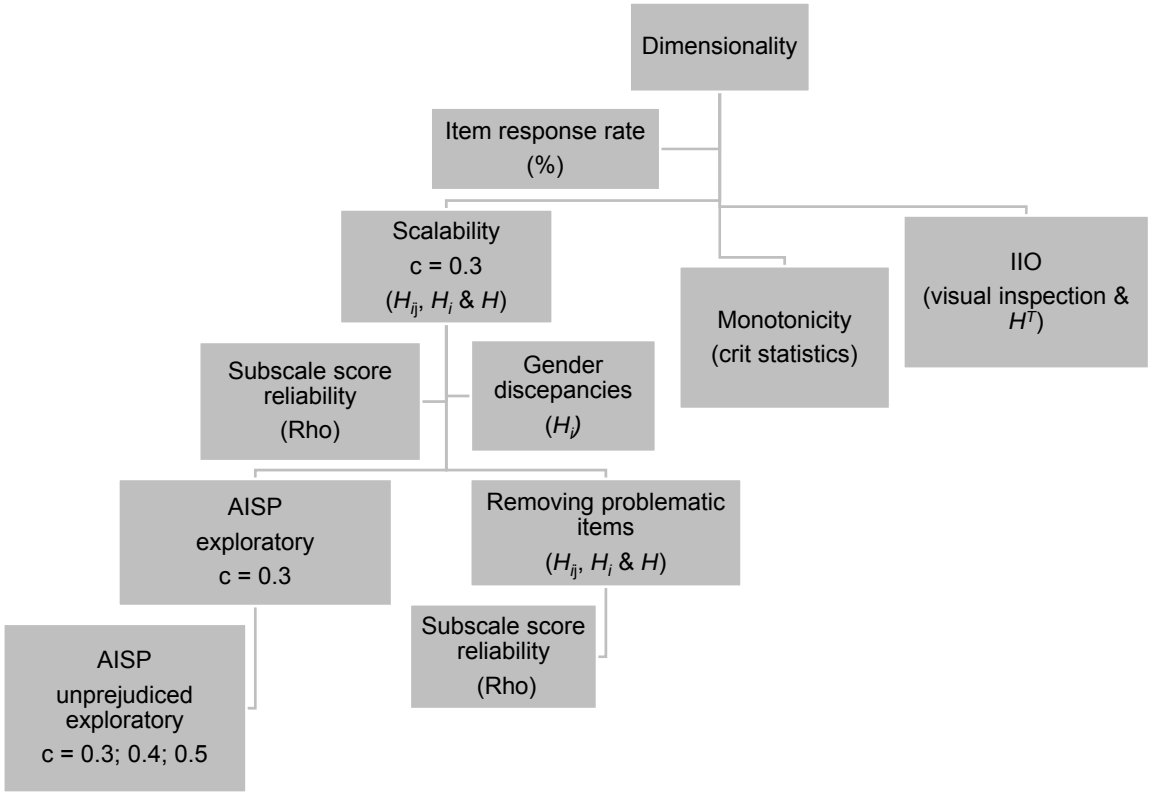

Figure 4. Depiction of statistical procedure.

The data were explored in relation to the item response rate (IRR) and the floor and ceiling effects. The IRR was examined as the proportion of respondents completing all inventorial items by which a level of ≥ 90% was considered an acceptable threshold. In order to investigate the possible floor or ceiling effects of the subscales – people obtaining minimum and maximum scores, respectively – descriptive statistics was used, assessing proportions and arbitrarily considering a poor result to be more than 20% of respondents scoring the minimum or maximum score (Streiner et al. 2014).

The scalability strength of the five a priori subscales subsequently investigated the assumption of unidimensionality. The MSA works by pursuing unidimensional sets of items based on Loevinger's definition of homogeneity and the coefficient *H* (Loevinger 1948), the extent to which pairs of items, as scored by respondents, conform. Homogeneity is sometimes confused with internal consistency, the former denoting the unidimensionality of a measure while the latter refers to the degree of interrelatedness among items in a measure (Tavakol & Dennick 2011). The core difference between the two is that items can be interrelated as well as multidimensional, and internal consistency is a required but not sufficient condition for test homogeneity. Mokken scales are defined by means of scalability coefficients (Mokken 1971). The first part of the MSA involves the testing of hypotheses about these scalability coefficients, three of which are indispensable: 1) For each pair of items, *i* and *j*, there is an *item pair-scalability coefficien*t, denoted as H_{ij}, which can be attributed, in very simple terms, as the covariation between two ordered variables. 2) Analogous to the pairwise coefficient, there is also an *item scalability coefficient*, designated as H_j, articulating the degree to which an item is related to the sum score based on the remaining set of variables. 3) For the entire set of items, there is a *test scalability coefficient*, denoted as *H*, conveying the degree to

which the total scores accurately rank persons on the latent trait. The common practice for interpreting dimensionality by means of coefficient H is: a scale is considered strong when estimate $H \geq 0.5$, moderate for $0.4 \leq H < 0.5$ and weak for $0.3 \leq H < 0.4$. If the scalability is found to be insufficient, $0<H<0.3$, it is considered very weak, and the sum score approach might be discarded as unsuitable, suggesting that the instrument produced scarce or negligible information (Sijtsma & Molenaar 2002). A scale of $H < 0$ is considered counterproductive and warrants deletion of an item/items. Additionally, a scalability analysis of these data was employed to scrutinize whether items and scale structure differentiated between women and men.

Monotonicity and IIO were subsequently investigated. Monotonicity was assessed through the number of violations of the assumption, and the seriousness of these violations was evaluated by means of the crit statistics. The crit statistics (Molenaar & Sijtsma 2000:47) is a weighted sum of other components, (i.e., H_i, the number of possible and actual violations in which the item can be involved) and may be used for evaluating monotonicity (Van der Ark 2012). According to Stochl et al. (2012), items for which crit statistics are < 40 can be regarded as not in serious violation of the criteria for monotonicity and can therefore be included in the Mokken scale as deprived of impairment. IIO was visually assessed by plotting item pairs and scrutinizing for non-intersection of item characteristic curves. Further, a comparable coefficient to Loevinger's H coefficient called *Htrans* (H^T) was employed; the range of values of H^T is as follows: $0.3 \leq H^T < 0.4$ designating weak IIO; $0.4 \leq H^T < 0.5$ and $H^T \geq 0.5$ indicating moderate and strong IIO, respectively (Ligtvoet et al. 2010; Watson et al. 2014).

Rho was used to estimate the score reliability of the subscales, the values of which should exceed 0.70 (Sijtsma & Molenaar 1987, 2002). This method was advanced by Sijtsma and Molenaar (1987), specifically in the context of the MSA, and was intended as a development of the reliability coefficient, Cronbach's alpha (Sijtsma & Molenaar 1987).

In the subsequent step, an exploratory analysis was employed using an MSA feature called automated item selection procedure (AISP) to find Mokken scale solutions from the set of items in each of the five subscales. First, a set of items forms a so-called Mokken scale if two conditions are met: (1) for all item pairs, scalability coefficient H_{ij} is > 0, and (2) scalability coefficient H_i is greater than some a priori chosen lower-bound discrimination threshold. This minimum scalability threshold coefficient is also known as the user-specified constant, c. A lower-bound value c is optional, though its default value equals 0.3. Following this, additional items are selected in sequential order on the basis of the following criteria: (1) the item correlates positively with the formerly selected items; (2) its scalability coefficient with respect to the selected items is > 0 and surpasses the user-specified constant; and (3) the accumulation of the item produces the largest scalability coefficient of all the items that could have been selected. When there are no surplus items that meet these criteria, a new iteration begins using the remaining unselected items. The AISP ends when all items in the pool have been partitioned into a Mokken scale or when none of the remaining items meet the discrimination criteria. This procedure was concluded with an unprejudiced exploratory analysis, leaving the AISP completely free establishing Mokken scale solutions from the entire 50-item inventory pool.

Studies IV and V

For both *Studies IV* and *V*, inductive qualitative content analyses were used to analyze the data collected in the focus group and semi-structured interviews. Knowledge generated from the qualitative content analysis was based on participants' unique perspectives (Hsieh & Shannon 2005). Content analysis describes a family of analytic approaches ranging from impressionistic, intuitive, and interpretive analyses to systematic, strict textual analyses (Rosengren 1981). However, there are some commonalities, and qualitative content analysis could be defined as a method for interpreting the content of text data through a systematic, iterative process of coding and identifying themes (Elo & Kyngas 2008; Graneheim & Lundman 2004; Hsieh & Shannon 2005; Krippendorff 2013).

One archetypal trait of qualitative content analysis is that it places preeminent emphasis on the context and subject. Another distinctive trait is that the method handles data on different levels of interpretation. One way to understand the theoretical assumptions underlying qualitative content analysis is to relate the method to communication theory and some tentative axioms of communication, as described by Watzlawick and colleagues (2011). First, interview-based texts are formed within an interaction between the investigative researcher and the interviewees, thus portraying an act of communication. Second, it suggests a depiction of the manifest content as what the text explicitly says, dealing with the surface structure and the most obvious meanings of the text. Conversely, the latent content is extended to an interpretative reading of what the text implicitly talks about and captures the deep structural meaning conveyed in the text (Berg 2007). In this thesis, the qualitative content analysis used to explore the data, mainly the analytical procedure and nomenclatures, was inspired by as outlined by Graneheim and Lundman (2004). The analysis in both studies entailed several steps, moving recursively back and forth. The incorporated steps in *Studies IV* and *V* are presented separately below.

In *Study IV* the transcripts were examined line-by-line, and sub-categories and categories were developed without predetermined coding schemes. The analysis incorporated several steps: i) the transcribed interviews were read numerous times to become familiar with the text and to identify meaning units relating to the aim of the study and the questions in the interview guide; ii) the meaning units were condensed, and codes depicting the phenomenon under investigation were created; iii) the codes were unitized and abstracted into sub-categories and categories describing the manifest content of the data and were iteratively discussed during the analysis; iv) interpretative cross-contrasting of sub-categories and categories were performed; and v) the analysis focused primarily on an interpretational level, i.e., going beyond the explicit manifest content. Sub-categories and categories were interpreted and explored into themes expressing the underlying latent content of the data (Graneheim & Lundman 2004).

Although the steps above seem sequentially ordered, the analytical process and search for patterns were in no way linear; they were dynamic, iterative, and recursive. While performing this ingeminated analysis, it became apparent that some categories were somewhat congruent with the framework of human environments proposed by Moos (1973). Therefore, in the latter stage of the data analysis, this framework was juxtaposed with the emerging data and used as a lens for further analysis. Noteworthy, however, the analysis was still inductive in

nature. During this analytical phase, another investigator (a senior researcher not eligible as author) was recruited to contribute to the investigative process. Throughout the analytical process, and primarily due to my, as the principal investigator, prior understanding of the empirical context, constant comparisons between the sub-categories and categories and the original data transcripts were made to ensure a good fit between the data and findings (Figure 3). Careful consideration was given to Patton's dual criteria of internal homogeneity and external heterogeneity (Patton 2002). Emerging themes were continually discussed until a consensus was reached among the investigators.

In *Study V* the analysis was conducted manually by the entire research group. It focused on the interpretational level, with the transcripts subjected to both manifest and latent content analysis. The analysis was carried out in two steps: first, an exploration of teachers' experiences of the educational environment; second, an exploration of teachers' conceptualizations of the educational environment. Both steps were analyzed in the same way. Similarly, the data from the two groups, chiropractors and physiotherapists, were analyzed separately, although simultaneously.

All investigators independently performed the first reading of the text. The transcripts were read in detail by at least two researchers several times in order to become familiar with the material. The interview material was also purposely allotted so all of them were analyzed at least by one of the more senior researchers. Inspired by the first reading, meaning units were identified, condensed, and then labelled with a code close to the content, illustrating the phenomenon under investigation. Subsequently, the codes were abstracted and assembled into subject areas by the two principal authors. Within each subject area, the statements were critically and iteratively discussed, read, and juxtaposed, allowing for categories describing the manifest content of the data to be identified. As a consequence of further analysis and investigator dialogue, categories were interpreted and explored into overarching themes expressing the underlying latent content of the data. In analyzing the teachers' conceptualization of the educational environment, the interpretation was specifically geared toward the latent content and was labeled and described as dimensions portraying conceptual aspects of the phenomenon. Lastly, contrasts between the two datasets were identified from a cross-contrasting of categories and themes as well as dimensions. The categorization and thematization was discussed and subjected to adjustments until consensus was reached. Even though the aforesaid steps seem chronologically and sequentially ordered, the analytical search for patterns was in no way linear but rather iterative and recursive.

Quality criteria in qualitative and quantitative research

Sound research is featured by evidence that is trustworthy, pertinent to other contexts, consistent, and neutral, regardless of whether a qualitative or quantitative approach is used (Frambach et al. 2013). Qualitative research is aimed at a deep understanding of specific cases or phenomena in a particular context whereas quantitative research strives to generalize findings (Patton 2002). Nevertheless, while qualitative and quantitative research methods share doctrines and criteria for the quality of evidence, the notion and operationalization of these standards differ between the two approaches. These quality principles are often discussed with the terms validity and reliability in quantitative research and with trustworthiness in qualitative research. Trustworthiness comprises the extent to which the

findings from an investigation are plausible and convincing (Koch & Harrington 1998). There are, nevertheless, diverse views on which concepts and terms to use in describing and conferring trustworthiness in qualitative research (Graneheim & Lundman 2004; Rolfe 2006). Some scholars maintain the use of concepts that are usually associated with quantitative research traditions, e.g., validity, reliability, and generalization (Silverman 2006). Others assert that since qualitative research is paradigmatically and principally different, this requires the use of other concepts to articulate the notion of trustworthiness (Koch & Harrington 1998). A number of researchers even claim that it is insurmountable to settle for comprehensive and general criteria when evaluating the quality of qualitative inquiries and reason that research investigations will be arbitrated on their internal coherence and the reflexive approach of the researcher throughout the process (Koch & Harrington 1998; Rolfe 2006). Lincoln and Guba's (1985) seminal work identified and proposed four criteria for developing the trustworthiness of a qualitative inquiry: credibility, transferability, dependability, and confirmability, which were used as a framework in this thesis. These four criteria represent parallels to the post-positivist criteria of internal validity, external validity, reliability, and objectivity.

Below is an overview of the core principles, including references to criteria from both the quantitative and qualitative research paradigms. However, due to differences in the two research traditions, emphasis is predominantly on quality criteria in qualitative research as performed in *Study IV* and *V*; thus, quality criteria for quantitative research as performed in *Study I-III* are discussed further in other parts of this chapter (see also Chapter 2). Each of these quality criteria is initially presented with a rhetorical question modified from Dahlgren and colleagues (2007) and influenced by Frambach et al. (2013).

To what extent can we have confidence in the "truth" of the findings?

Truth value of evidence denotes the ability to capture what was actually studied, signifying that the findings are not merely a product of design errors, misapprehensions, or the impact of unknown factors. In naturalistic inquiry, credibility is used to describe the extent to which the findings are believable to others, how well the data and the research process address the envisioned focus, and the congruency with the investigated phenomenon (Lincoln & Guba 1985; Shenton 2004).

Strategies aimed at achieving credibility are conducted through the use of multiple data sources, the adoption of appropriate, well recognized methods for collecting and analyzing data, anchoring the data with the intended focus, and addressing conclusions emanating from the data (Graneheim & Lundman 2004). Investigators need to develop an early familiarity with culture and establish a relationship between the investigator and the participants in order to gain an adequate understanding of a context prior to the data collection (Shenton 2004). Credibility is also about capturing the multiple realities of the participants. It also entails how well categories and themes cover the data, the judgments of similarities within, and differences between, categories.

Several efforts were made during the qualitative studies (*IV* and *V*) to enhance credibility. Due to my background and pre-understandings of the chiropractic context, the first step was to become familiar with the physiotherapy context and to get an understanding of the case.

This was done through formal and informal meetings, auscultations, and study visits. Further, by conducting the interviews and being in situations with the participants, I became close to them and was able to some degree understand their reality. During the various processes, investigator triangulation (Graneheim & Lundman 2004; Patton 2002; Polit & Beck 2010) was used to view and interpret the data from different perspectives. The group of investigators consisted of individuals belonging to professions in chiropractic, physiotherapy, medicine, and education. Thus, the investigator group comprised researchers with different experiences and perspectives, including both quantitative and qualitative research traditions. The appropriate research approach and methods were then chosen in relation to the aims of the studies. Sampling methods were chosen to get a wide and eclectic variation of participants with different experiences of the educational environment. In the process of analysis, credibility was pursued by selecting meaning units that consisted of adequate data size to be explored, though neither too extensive nor too fragmented. Careful attention was paid to Patton's concepts of internal homogeneity and external heterogeneity. Furthermore, credibility was heightened by presenting the findings with quotes, thus showing that the results covered the range of variation found in the data (Dahlgren et al. 2007; Graneheim & Lundman 2004; Patton 2002). Finally, another strategy for achieving credibility was frequent peer debriefing sessions, with the project discussed and scrutinized by colleagues and academics over the duration of the investigation (Shenton 2004).

In contrast, in quantitative research, truth value is expressed by means of internal validity or lack of bias. Internal validity is evaluated by means of how well the threats to it have been controlled. A sample is drawn from a population and exposed to statistical analysis, and conclusions are based on whether the sample pertains to the population. Further, in survey research, internal validity often denotes the rigor of measurement and that the concepts one sets out to measure are actually measured. In this thesis, the establishment of the truth value of the evidence was achieved by using a well-recognized and internationally established instrument (DREEM), which has been widely used in different educational contexts. This instrument has been reported to have good psychometric properties in diverse settings. Further, internal validity was enhanced by ensuring a high response rate, collecting and presenting descriptive demographic data, and thorough explanations of the empirical setting.

To what extent are the findings pertinent to other contexts?

The applicability of evidence designates the extent to which the findings can be transferred or applied to different settings. Qualitative research is dependent on the context in which the study was conducted, but the findings can be used to understand a similar phenomenon in other settings (Shenton 2004). Thus, the findings from this thesis as outlined previously in this chapter are not aimed towards empirical generalizability but towards conceptual applicability to other contexts and analytic generalization (Yin 2003).

Thick, rich, and explicit descriptions of the research can allow comparisons to be made and facilitate transferability. Conversely, only the recipient reader can truly judge whether there are similarities between contexts and whether the findings can be conveyed (Lincoln & Guba 1985; Shenton 2004). The endowment of the research process and detailed contextual and methodological descriptions urge the recipient reader to appreciate the phenomenon under

scrutiny, to be uncompelled to conclude interpretations, and to consequently arbitrate judgments of transferability (Patton 2002; Shenton 2004).

In this thesis, a thorough description of the contextual settings, the participants, and the analysis was provided to the reader with the intent to proffer the potential transferability of the findings to other settings. Further, presenting findings together with links and resonance drawn between the results, the theory, and the prevailing literature may create possibilities for the recipient reader to appraise the transferability of the findings to his/her own context.

Applicability in quantitative research is appraised as external validity or generalizability. External validity is used to generalize how representative the sample is and whether the results from a small sample can be protracted to make predictions about a target population. This restricted sense of generalizability is sometimes referred to as statistical generalizability (Kvale 2009); thus, the level of generalizability hinges entirely on the sampling technique used and the demographic similarities between the sample and the target population (Dahlgren et al. 2007). However, throughout the research, I maintained cognizant of the restrictive choice of a convenience sampling strategy, thus employing a non-probability sample and making no generalizability claims.

The findings of a qualitative study are not intended to be generalizable in the same way as in a quantitative study. Nevertheless, they may well be transferable to other settings and be used to clarify, modify or generate theories. In a case study methodology analytic generalization is often used, which is not generalization to some demarcated population that has been sampled, but to a theory of the phenomenon under investigation – a theory that may concede a much wider applicability than the actual case studied (Yin 2003). Herein echoes experiments in the post-positivist paradigm where no claim of statistical representativeness is made; rather, there is the assumption that results can promote a general theory of the phenomenon.

To what extent are the findings consistent, and can they be replicated while examining the same participants in the same context?

For quantitative research, reliability is a cornerstone quality criterion to establish consistency of evidence. Reliability is the degree to which findings are consistent if a study were to be replicated. In psychometrics, the concept of reliability is often defined as the internal consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions. Reliability is a central quantitative tradition because it constitutes a foundation for validity and measures whether a study obtains the same result each time. In this thesis, consideration to the consistency of evidence was approached by utilizing an instrument that has consistently displayed good reliability in various contexts worldwide, by estimating the internal consistency across repeated measures, and by estimating item, test, and person parameters through item response theory.

Consistency in qualitative research, i.e., dependability, refers to the extent to which findings are consistent in relation to the context in which they were generated. It is the aptitude of the investigator to account for: factors of instability and the persistently shifting conditions of the studied phenomenon, the interface with participants and design-induced changes (Dahlgren et al. 2007; Graneheim & Lundman 2004). Hence, it is the degree to which data alters over time and changes made in the researcher's decisions during the course of analytical process. To

evaluate dependability, the course of the study has to be meticulously reported to enable impending replication, though not mandatorily reaching the same outcome (Shenton 2004). Lincoln and Guba (1985) highlight the proximity between dependability and credibility, asserting that credibility goes some distance to ensure dependability.

The data generated in this thesis was collected during a restricted period to enhance dependability. During the research process, there was an endeavor to make the method employed as structured, transparent, and clear cut as possible. Stepwise descriptions and replications of the analyses enhanced dependability, allowing others to judge the soundness of the research (Dahlgren et al. 2007; Graneheim & Lundman 2004). Iterative intra- (among investigators) and inter-discussions (with peers) of the results and congruence on the credibility of the findings enabled further dependability of the analysis. Further, the use of an interrogating diary for reflective note-taking during the process of data collection, and discussing them with the research group for transparency, was an audit trail for subsequent investigators.

To what extent are the findings affected by personal bias, motivation, or interests?

Neutrality of evidence refers to freedom from bias in the process of research and its product (Sandelowski 1986). In quantitative approaches, objectivity is the benchmark of neutrality and is attained when validity and reliability are entrenched. In naturalistic inquiry, the neutrality of evidence can be described in terms of confirmability (Lincoln & Guba 1985) and deals with how colored the result is. Countering the quantitative view, Lincoln and Guba propose that confirmability is attained when truth value, applicability, and consistency are endorsed. Shenton (2004:72) states that "steps must be taken to help ensure as far as possible that the work's findings are the result of the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher." To achieve confirmability, the findings and data must be prominently linked, thus inaugurating an internal coherence of the data with respect to the findings, interpretations, and counteractive actions (Denzin & Lincoln 2011). Thus, confirmability is accomplished when the study results reflect views from the informants of a study and when the data speaks for itself and is not fabricated on the basis of researcher bias and assumptions. Patton (2002) argues that the ideals of complete objectivity and value-free science are impervious to attain in practice and are of dubious desirability since they disregard the inherently social nature and human aspiration of scientific scholarship.

According to the quantitative inquirer, the objective researcher remains distant so that he/she is not influenced by the participants and does not influence the study (Lincoln & Guba 1985). However, I believe that distancing oneself is impossible whatever the research paradigm in which one is situated. Concurring with others, my pragmatic perspective is that scientific neutrality is itself a socially constructed phenomenon and that no rule or convention can change the fact that one can study a phenomenon without changing or affecting it (Patton 2002; Sandelowski 1986). Further, Patton (2002) infuses some clarity in the objectivity versus subjectivity discourse and puts forward the concept of empathic neutrality as a more valid description of how scholars should approach research. Morgan (1983) further notes, with his pragmatic view on inquiry, that any investigation and its findings are at least as much a reflection of the investigator as of the phenomenon studied. Even though Dewey's

pragmatism did not deny objective truth, his efforts at defining pragmatism were fundamentally aimed at reconciling the frailty of human perspective concerning and relating to objective reality. According to Hildebrand (2011), Dewey's notion of objectivity was not an end state of inquiry but rather a virtue of practice, a regulative ideal for inquiry. Dewey battled persistently against the separations of subjectivity and objectivity and that which tears apart the seamless cloak of experience by bringing together the concepts under the umbrella of inquiry (Lachs & Talisse 2008). Anchored in my conception and appreciation of the neutrality of evidence, this requires reflection throughout the research process. Moreover, the transparency of assumptions and theoretical perspectives allows accessibility for the inquiry to be closely examined.

In this thesis, confirmability was addressed by means of strategies described above such as investigator and data triangulation, to reduce the effect of investigator bias. The introduction of this chapter also paves the way for a foundation for my philosophical positioning, thus explicitly rendering my beliefs and assumptions, along with an in-depth methodological description to permit the integrity of this work to be scrutinized. Additionally, Lincoln and Guba (1985) propose reflexivity as a technique for establishing confirmability. They regard the concept as an attitude of attending systematically to the context of knowledge construction, especially to the effect of the researcher, at every step of the research process. The following section addresses the issue of reflexivity.

Reflexivity

Reflexivity means acknowledging the influence a researcher brings to the research process and the process of reflecting critically on the "human as instrument" (Denzin & Lincoln 2011:124). It is required in qualitative research and means. "A researcher's background and position will affect what they choose to investigate, the angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and the framing and communication of conclusions" (Malterud 2001:483). Thus, reflexivity emphasizes being conscious of one's own perspective and role in the research process, and the potential power relationships between the researcher and participants, which could shape the findings (Kuper et al. 2008).

My background is chiropractic. Although I have a license to practice, I have never engaged in clinical practice. Immediately upon graduating from the SCC, I was offered a position as an assistant teacher, and shortly thereafter, I worked as a full-time lecturer before I joined Karolinska Institutet. I have always loved teaching, which is also linked to my background in and experience as a dance teacher. Thus, with many years of teaching undergraduate chiropractic students, I had comprehensive experience and sound knowledge of teaching and learning when I started this research endeavor.

In this thesis, I considered myself as having both an intrinsic and extrinsic perspective: intrinsic because I am familiar with the chiropractic context and the different stakeholders therein; extrinsic because I am not a physiotherapist myself and have no personal experience of undergraduate training in major state-funded universities. My teaching experience and knowledge about educational environment research sometimes made me reflect on the conceptualization of educational environment, its meaning, what constituted good and bad

conditions for learning, and the way the training and teaching were designed and executed. I was aware of this, and endorsed the thoughts through my mind, but paid attention to emphases on the overall aim and the specific research objectives and research questions when interviewing teachers and students.

I have determinedly tried to be unprejudiced for my data: unprejudiced during the data collection, candid about what the data said as well as about enthusiastic and unenthusiastic environmental experiences. During the interviews, my professional background and role as a teacher served as an advantage since I had knowledge and understanding of what to look and ask for. However, an important aspect to consider is that I, as a researcher, also worked as a teacher at the SCC during the process of data collection. Thus, the data for *Study II* was therefore collected by a member of staff to avoid any influence due to my faculty position. My teaching position may have discouraged the students participating in *Study IV* from speaking freely, potentially affecting the analysis. Notwithstanding, countermeasures were taken to reduce any potential power imbalance. Thus the year 1 participants were not assessed by myself during any of the examinations over the 2-year time frame of the study and for year 4 participants, this was not arbitrated as an issue as I was not involved in teaching at this level. For the *Study V* interviews, I did not interview my peers. They were interviewed by a co-author. A presumption was made that if the interviewer and interviewees came from the same profession, this would decrease the depth of the interview and the possible pre-understandings clouding the data. I also made major attempts at assuring possible participants of confidentiality and voluntary participation as well as furnishing them with information about the aims of the research and the research process. My role as data collector might have further resulted in missing relevant phenomenal portrayals. To evade this, the interview guide consisted of broad questions intended to get as much rich material as possible, and the recurring discussions and reflections within the research group unremittingly challenged my pre-understanding (Kuper et al. 2008). Further, the fact that the other investigators did not have contact with the two cases, and their disparate professional backgrounds, also enabled other perspectives into the analysis process. By iteratively and consistently pledging with the overall aim and the specific objectives, I focused attention on data linked to the students' and teachers' experiences of the meaning of their educational environment. There is a risk that the analysis of the data was somewhat affected by my own assertions, conceptions, and previous knowledge of the educational environment phenomenon and the investigated chiropractic case. As qualitative analysis involves interpretative approaches to data, there is always a degree of directed interpretation when working with interview material. However, I reflected on my own understanding and pre-understanding, conferred with peers, and used numerous strategies to achieve credible results. Further, I sought a thick description of the contexts, data collection, and analysis, including researchers' logs and reflective notes.

Despite experience performing and disseminating quantitative research and working with some qualitative approaches, I had limited experience of qualitative interviewing. During the process, my proficiency as an interviewer and analyst developed. This development in my communication and analytical skills may have influenced the quality of the interviews in the qualitative studies.

While setting up this this research project, I was not so clear about my philosophical stance. I found concepts such as philosophy, theory and epistemology almost impenetrable. I had the

distressing sensation of moving into unfamiliar territory, like being transported from the dancefloor to the football field where well-known landmarks had vanished. I believe that my problems were instigated by a collision of worldviews – or to a certain extent, a collision between my prior experiences of post-positivist research and scholarly work and the variability and flexibility of educational research, which challenge their own paradigms as a matter of course. Concurring with Kneebone (2002), I have become aware of the decisive significance of other views of the world and that becoming conscious of them is central if one wants to make sense and understand educational research and research in general. Thus, during the course of this doctoral work, these concepts have become more lucid.

Ethical considerations

Research has a danger of impinging on people's lives, integrity, and autonomy. To mitigate the potential effects, conducting ethically sound research is a fundamental principle of scientific inquiry. Kjellström and colleagues (2010) maintain that ethical considerations in research have to be accounted for in numerous ways. The study was conducted following national ethical guidelines for research involving human subjects (SFS 2003:460) and was approved by the Regional Ethical Review Board in Stockholm (2012/416-31/5).

The study was not comprised of and did not disregard specific vulnerable groups, neither did it lure participants with promises of rewards. The data, collected in 2009 for the longitudinal purpose of *Study II*, was granted by the Scandinavian College of Chiropractic Scientific Council as part of scholarly evaluation work performed in the context of higher education at an advanced master's level.

Ethical considerations regarding methods for data collection were discussed iteratively between me and the others in the research group throughout the project. Information about the nature and purpose of the study was sent electronically to the participants prior to the data collection for all five studies. Participants were further informed about the study orally at the time of the data collection. Written informed consent was obtained from all participants, and full confidentiality was guaranteed (*Studies I, II,* and *III*). Students not present at the time of the data collection were invited to participate electronically. These participants consented by returning the answered inventory and by selecting a check box for approval. Written consent was obtained from all students and teachers (*Studies IV* and *V*) before the interviews started, and permission was sought prior to recording the interviews. Participation was voluntary, and participants were informed that they could withdraw at any time. The collected data was anonymized to maintain the integrity of the individual responders, and the data was handled and stored in accordance with the tenets of the World Medical Association Declaration of Helsinki (2008).

5 FINDINGS

The overall aim of the five studies incorporated in this thesis was to provide a deeper understanding of the phenomenon of the educational environment, and more specifically explore what constitutes educational environments and what they mean to the actual context of different members within chiropractic and physiotherapy education. This chapter presents the main findings from each of the studies and concludes with an overview of the core results.

STUDY I – STUDENTS' PERCEPTIONS OF THE ENVIRONMENT

This study aimed to explore areas of strength and weakness in the educational environment as perceived by undergraduate physiotherapy students and to investigate these in relation to the respondents' demographic characteristics.

A total of 222 physiotherapy students (80%) completed the DREEM inventory. Students in terms 1, 2, and 4 yielded higher response rates, 81%, 87%, and 99%, respectively, than students in terms 3 and 5, 72% and 73%, respectively. The respondents included 169 female (76%) and 53 male (24%) students with a mean age of 24.7 (median 23; interquartile range (IQR) 21–26; range 19–52) years.

The overall reliability coefficient was high, with alpha being 0.935, and the subscales displayed alpha values ranging from 0.867-0.633 and exceeding the .70 threshold, except for SASP and SSSP.

The overall score for the five cohorts was 150 out of 200 (75%), ranging from 73 "plenty of problems" to 200 "excellent." SPA and SSSP generated the highest subscale scores (78%) while SASP produced the lowest subscale score (72%). Interpreting the subscale scores according to the constructors' guidelines revealed that students perceived teaching positively; that teachers were moving in the right direction; students were positive about their academic success; that they had a good overall feeling about the atmosphere and had very good social self-perceptions.

There was a fair to high degree of covariance among the subscales, and this was most evident between SPL and SPA, thereby indicating dependent subscales.

The total item mean amounted to 3.0. The highest mean score for an individual item was 3.6 (items 2 "The teachers are knowledgeable" and 33 "I feel comfortable in class socially"). The lowest observed mean score was 1.9 for items 9 "The teachers are authoritarian" and 25 "The teaching overemphasizes factual learning," these being the only two items scoring less than the expected mean. For these two items, less than 50% of the respondents disagreed or strongly disagreed, and more than 20% agreed or strongly agreed. The condensed Table 9 presents the scores for the most problematic individual items.

Terms 1 and 2 scored 78% and were the most positive towards the environment, terms 3 and 5 scored 74%, and term 4 were the most negative and scored 68% of the maximum score. The terms differed significantly from each other in relation to both the overall and subscale scores. When multiple comparisons were used, they revealed that term 4 students differed

statistically significantly; this was most discernible in comparison to students from earlier terms.

There were no statistically significant differences between the groups with regard to the overall or subscale scores. Three items differed significantly between males and females: items 13 "The teaching is student-centred," 15 "I have good friends in this school," and 27 "I am able to memorize all I need," with female students displaying higher scores for the first two items and a lower score for the third.

Table 9. Proportions of clustered categories, means and standard deviations for individual red flagged DREEM item scores (n = 222).

Item	Phraseology	n	Agree or Strongly agree %	Unsure %	Disagree or Strongly disagree %	Mean (SD)
3.	There is a good support system for students who get stressed[5]	221	**42**	**48**	10	2.5 (1.0)
4.	I am too tired to enjoy this course[5]*	222	60	11	**29**	2.5 (1.2)
6.	The teachers are patient with the patients[2]	209	67	**32**	1	3.0 (0.9)
9.	The teachers are authoritarian[2]*	221	**37**	20	**43**	**1.9 (1.1)**
18.	The teachers have good communication skills with patients[2]	208	67	**31**	2	2.9 (0.8)
25.	The teaching overemphasizes factual learning[1]*	221	**32**	29	**39**	**1.9 (1.0)**
29.	The teachers are good at providing feedback to students[2]	220	58	21	**21**	2.5 (1.0)
48.	The teaching is too teacher centered[1]*	222	50	**31**	19	2.4 (1.0)

Notes: Negative items, where scores have been reversed, are marked with an asterisk (*) and must accordingly be interpreted by adding or subtracting the prefix "dis-" respectively.
Item scores that indicate problematic areas (score ≤ 2) and items scoring < 50% Agree/Strongly agree, > 30% Unsure, > 20% Disagree/Strongly disagree are marked in bold.
Superscripts numbers designate which subscale the item belongs to: [1] SPL, [2] SPT, [3] SASP, [4] SPA, [5] SSSP.

There were no statistically significant differences between the groups with respect to overall or subscale scores regarding age. When the participants were dichotomized as less than or equal to 23 years and greater than or equal to 24 years using an arbitrary cut-off point close to the mean, three items differed significantly between younger and older students. Younger students recorded lower scores for items 9 "The teachers are authoritarian" and 25 "The teaching overemphasizes factual learning" while older students reported lower scores for item 15 "I have good friends in this school."

Regarding the participants' immigrant background, nine students (4%) reported being born outside of a Nordic country which seven (3%) reported that both parents were born outside of a Nordic country. Because of the small subsample, no statistical analysis was conducted.

There was a statistically significant lower mean value for the SPA subscale among those who had earlier experience of university studies. The overall score and other subscales exhibited no significant differences. Three items deviated significantly between participants who had no past experience of higher education and those who did: items 12 "This school is well timetabled," 15 "I have good friends in this school," and 28 "I seldom feel lonely," with the latter group consistently scoring subpar.

A manifest content analysis of the open-ended question yielded the following six themes:

- Deficiency in the physical environment
- Lack of practical training
- Pedagogical diversity and percipiency
- Factual cramming
- Autonomy and time for reflection
- Inadequate organization and information

STUDY II – STUDENTS ' PERCEPTIONS OF THE ENVIRONMENT OVER TIME

In this second study the aim was to compare the perceived educational environment among undergraduate chiropractic students at two different points in time and to longitudinally examine potential changes in the perceptions of the educational environment over time.

In 2009 and 2012, 83% and 75%, respectively, of the students completed the DREEM inventory. Fourteen percent (n = 34) of them were available for follow-up, constituting 27% of the 2009 sample, and their scores from years 1 and 2 in 2009 were compared with those from years 4 and 5 in 2012.

The internal consistency of DREEM, calculated using the subscale scores, showed acceptable Cronbach α values, with four (SPL, SPT, SPA, and SSSP) of the five subscales surpassing the .70 threshold in 2009. In 2012 α values ranged from 0.569- 0.727 with only two subscales (SPL and SPA) exceeding the threshold.

The overall mean score was 156 (78%) in 2009 and 153 (77%) in 2012. The difference between the two means was not statistically significant.

In 2009, year 1 recorded the highest overall mean score (84%), and year 4 recorded the lowest overall mean score (75%). Similarly, three years later, year 1 reported the highest score (78%) while year 3 recorded the lowest score (75%).

In 2009, year 1 students also reported higher overall scores compared to their counterparts in 2012, but when the p values were adjusted for multiple comparisons, this was not significantly different. In comparisons between the 2009 and 2012 cohorts, only one of the five subscales was statistically significantly different (moderate effect size), with a lower mean sum score for the SPT subscale in 2012. Regarding the SPT subscale, there were differences between year 1 students at both time points, with the 2012 cohort exhibiting significantly lower mean scores (large effect size).

The total item mean amounted to 3.1 both in 2009 and 2012. In 2009, the total highest mean score (3.7) was reported for items 16 "The teaching helps to develop my competence" and 33 "I feel comfortable in class socially." The lowest mean score (1.8) was reported for items 3 "There is a good support system for students who get stressed" and 9 "The teachers are authoritarian." In 2012, the highest mean score (3.7) was also reported for item 16 "The teaching helps to develop my competence," and the lowest was 1.5 for item 25 "The teaching overemphasizes factual learning." In 2009, four items scored below the expected mean, three of which scored likewise in 2012. The condensed Table 10 presents the scores for the most problematic individual items.

Table 10. Proportions of clustered categories, means, p-value and effect size for individual red flagged DREEM item scores for comparison between two points in time.

		2009			2012			2009	2012		
		%	%	%	%	%	%	n = 124	n = 127	ρ	*d*
Item	**Phraseology**	**SD/D**	**U**	**SA/A**	**SD/D**	**U**	**SA/A**	**Mean**	**Mean**		
3	There is a good support system for students who get stressed[5]	**35**	**43**	**22**	**30**	**46**	**24**	**1.8**	**1.9**	.331	
7	The teaching is often stimulating[1]	2	6	92	1	9	90	3.4	3.2	**.048**	0.33
8	The teachers ridicule the students[2R]	88	4	8	84	10	6	3.4	3.2	**.044**	0.22
9	The teachers are authoritarian[2R]	**27**	27	**46**	**23**	21	**56**	**1.8**	**1.7**	.493	
12	This school is well timetabled[4]	**36**	24	**40***	**26**	17	57*	**2.0**	2.3	**.009**	0.27
25	The teaching overemphasizes factual learning[1R]	**33***	**32**	**35***	**16***	28	**56***	**2.0**	**1.5**	**.000**	0.55
29	The teachers are good at providing feedback to students[2]	8*	18	74	**21***	14	65	2.9	2.5	**.007**	0.44
34	The atmosphere is relaxed during seminars/tutorials[4]	2	5	93	3	9	88	3.5	3.2	**.005**	0.43
42	The enjoyment outweighs the stress of studying chiropractic[4]	7	11	82	2	9	89	3.1	3.4	**.011**	0.38
48	The teaching is too teacher centered[1R]	59*	**35**	6*	**40***	**41**	19*	2.7	2.3	**.000**	0.44
50	The students irritate the teachers[2R]	71*	21	8*	52*	30	18*	3.0	2.6	**.000**	0.40

Abbreviations: SD/D, Strongly Disagree/Disagree; U, Unsure; SA/A, Strongly Agree/Agree.

A superscript number indicates which subscale the item belongs to: [1] SPL, [2] SPT, [3] SASP, [4] SPA, [5] SSSP.

[R] Indicates negatively stated items for which scores have been reversed; these should be interpreted as a higher score, thus designating disagreement with the statement.

* Indicates $\chi 2$ tests between proportions where both percentages are ≥5% and differ significantly from each other at the .05 level.

ρ < .05 level (Wilcoxon-Mann-Whitney test) is presented in bold font.

d indicates effect size.

Item scores indicating problematic areas (score ≤ 2) and items scoring >20% Disagree/Strongly Disagree, >30% Unsure, and <50% Agree/Strongly Agree are marked in bold, as are negatively stated items >20% Agree/Strongly Agree, >30% Unsure, and <50% Disagree/Strongly Disagree.

The overall mean scores for the longitudinally surveyed sample (n = 34) was 156 (78%) in 2009 and 158 (79%) in 2012. The difference between these means was not statistically significant, and neither did the subscales display any significant differences. Among the two matching samples, the total item mean scores were 3.1 and 3.2 in 2009 and 2012, respectively. The summary in the abridged Table 11 displays the most problematic individual DREEM items. In 2009, the total highest mean score (3.7) was reported for the individual items 15 "I have good friends in this school," 23 "The atmosphere is relaxed during lectures", and 33 "I feel comfortable in class socially". The lowest score (1.5) was recorded for item 3 "There is a good support system for students who get stressed." Four items scored less than or equal to the expected mean while seven (14%) scored greater than 3.5. In 2012, the highest mean score (3.8) was reported for item 16 "The teaching helps to develop my competence." The lowest mean score was 2.0 for items 3 "There is a good support system for students who get stressed" and 9 "The teachers are authoritarian." Two items (4%) scored less than or equal to the expected mean while eight (16%) scored above 3.5. The abbreviated Table 11 displays the most problematic individual DREEM items. Two items (3 and 9) were below or at the expected mean both in 2009 and 2012. However, the mean score for both items was

higher in 2012, though the score was statistically significant only for the former. Two items, 12 "This school is well timetabled" and 25 "The teaching overemphasizes factual learning," which were below the expected mean in 2009, exceeded the threshold in 2012, but the difference was not statistically significant. However, there were high proportions of disagreement with the first statement and low proportions of disagreement and high proportions of uncertainty and agreement with the second statement.

Table 11. Proportions of clustered categories, means, p-value and effect size for individual red flagged DREEM item scores for longitudinal comparison.

		2009			2012			2009	2012		
		%	%	%	%	%	%	n = 34			
Item	Phraseology	SD/D	U	SA/A	SD/D	U	SA/A	Mean	Mean	*ρ*	*D*
3	There is a good support system for students who get stressed[5]	**50***	**32**	**18**	**27***	**44**	**29**	**1.5**	**2.0**	**.046**	0.42
4	I am too tired to enjoy this course[5R]	**68**	11	21	71	8	**21**	2.8	3.0	.576	
5	Learning strategies which worked for me before continue to work for me now[3]	15	29	56	6	18	76	2.7	3.1	**.027**	0.40
7	The teaching is often stimulating[1]	0	9	91	0	3	97	3.2	3.5	**.018**	0.50
9	The teachers are authoritarian[2R]	**26**	18	**56**	**38**	24	**38**	**1.7**	**2.0**	.268	
12	This school is well timetabled[4]	**32**	18	50	**24**	12	64	**2.0**	2.4	.299	
21	I feel I am being well prepared for my profession[3]	0	12	88	0	9	91	3.3	3.6	**.029**	0.50
24	The teaching time is put to good use[1]	12	12	76	6	6	88	2.9	3.3	**.034**	0.40
25	The teaching overemphasizes factual learning[1R]	**24**	**32**	**44**	**29**	**41**	**30**	**1.6**	2.1	.082	
29	The teachers are good at providing feedback to students[2]	**26***	6	68	3*	15	82	2.5	3.1	**.005**	0.60
48	The teaching is too teacher centered[1R]	47	**41**	12	62	**35**	3	2.5	2.9	.110	

Abbreviations: SD/D, Strongly Disagree/Disagree; U, Unsure; SA/A, Strongly Agree/Agree.

A superscript number indicates which subscale the item belongs to: [1] SPL, [2] SPT, [3] SASP, [4] SPA, [5] SSSP.

[R] Indicates negatively stated items for which scores have been reversed; these should be interpreted as a higher score, thus designating disagreement with the statement.

* Indicates McNemar test between proportions where both percentages are ≥5% and differ significantly from each other at the .05 level.

ρ < .05 level (Wilcoxon signed rank test) presented in bold font.

d indicates effect size.

Item scores indicating problematic areas (score ≤ 2) and items scoring >20% Disagree/Strongly Disagree, >30% Unsure, and <50% Agree/Strongly Agree are marked in bold, as are negatively stated items >20% Agree/Strongly Agree, >30% Unsure, and <50% Disagree/Strongly Disagree.

STUDY III – MEASURING THE ENVIRONMENT MEASURE

This study aimed to investigate the psychometric properties of the Swedish version of the DREEM in a sample of undergraduate physiotherapy students by employing a non-parametric approach of item response theory.

Inventory response rate and demographic dictions has been presented in the findings of *Study I*. Thirty-nine participants (18%) failed to complete all fifty items, and the number of non-responses for each item ranged between 0.5–6.3%. Items 6 "The teachers are patient with the

patients" (5.9%) and 18 "The teachers have good communication skills with patients" (6.3%) displayed the highest proportions of internal nonresponses, and the analysis yielded that these omitted responses were nearly entirely from students in terms 1 and 2. Gauging for floor and ceiling effects exhibited no severe problems. No floor effects were observed in the data, and only minor ceiling effects were identified. The item scalabilities in relation to the subscales and their *H* coefficients are displayed in Table 12.

Table 12. Discrete item scalabilities in relation to the DREEM subscales.

SPL[1]	Item	1	7	13	16	20	22	24	25*	38	44	47	48*
	H_i	.440	.467	.472	.500	.514	.486	.427	.190	.418	.495	.341	.297
SPT[2]	Item	2	6	8*	9*	18	29	32	37	39*	40	50*	
	H_i	.257	.272	.299	.068	.264	.251	.287	.326	.253	.249	.299	
SASP[3]	Item	5	10	21	26	27	31	41	45				
	H_i	.096	.069	.336	.266	.250	.207	.350	.310				
SPA[4]	Item	11	12	17*	23	30	33	34	35*	36	42	43	49
	H_i	.382	.362	.128	.336	.287	.380	.360	.284	.198	.267	.375	.268
SSSP[5]	Item	3	4*	14	15	19	28	46					
	H_i	.238	.269	.275	.280	.250	.305	.071					

Abbreviations: SPL, students' perceptions of learning; SPT, students' perceptions of teaching; SASP, students' academic self-perceptions; SPA, students' perceptions of the atmosphere; SSSP, students' social self-perceptions.
A superscript letter indicates H coefficient for the subscale: [1]0.413, [2]0.254, [3]0.233, [4]0.297 and [5]0.244.
*Indicates negatively stated items.

The SPL subscale showed a moderate scalability, with most of the items contributing to the intended dimension. Two reversed items (25 "The teaching overemphasizes factual learning" and 48 "The teaching is too teacher-centered") were weak but related to each other. In the SPT subscale, reversed item 9 "The teachers are authoritarian" was negatively correlated with items 6 "The teachers are patient with the patients" and 37 "The teachers give clear examples." The analysis indicated a very weak scalability and with only item 37 (see item phrasing above) surpassing the threshold of $c > 0.3$. Further, item 9 had a negligible relationship with other reversed items (8 "The teachers ridicule the students", 39 "The teachers get angry in class", and 50 "The students irritate the teachers"). The SASP scale comprised no reversed items, but several items displayed negative correlations, especially items 5 "Learning strategies which worked for me before continue to work for me now" and 10 " I am confident about passing this year." The analysis generated an insufficient scalability, and items 5 and 10 showed no relationship with the remainder of the items or the SASP dimension. For SPA, the reversed item 17 "Cheating is a problem in this school" displayed virtually no correlation with items 36 "I am able to concentrate well" and 42 "The enjoyment outweighs the stress of studying chiropractic," and the subscale showed weak scalability. The SSSP dimension indicated insufficient scalability, and the value of item 46 "My accommodation is pleasant" was particularly low.

No major gender variations were observed for the SPL and SPA subscales. Male students displayed marginally higher H_i values for the SPT subscale. For SASP, both males and females showed similar responses, but with males displaying consistently higher H_i coefficients. While male and female respondents reported similar response structures, the male respondents reported mostly above the threshold for the SSSP subscale.

For the SPL subscale, item 25 "The teaching overemphasizes factual learning" showed some, though not significant, violations against monotonicity. For the SPT subscale, items 9 "The

teachers are authoritarian" and 40 "The teachers are well prepared for their classes" displayed very high crit values. Allocated to SASP, item 10 "I am confident about passing this year" exhibited a high crit value, thus indicating a violation of the assumption of monotonicity. For the SPA subscale, item 30 "There are opportunities for me to develop interpersonal skills" exhibited a threshold crit value, but a violation of the monotonicity could not be statistically demonstrated. In the SSSP dimension item 46 "My accommodation is pleasant" exhibited a tendency of high crit values but did not surpass the threshold.

Item pair plots showed that, while there were no intersecting items (which would indicate violation of IIO) and most of the item characteristic curves for individual scales clustered together, a few item characteristic curves lay at some distance from the rest, for example, item 9 "The teachers are authoritarian" and item 36 "I am able to concentrate well". The SPL and SPT subscales displayed moderate IIO by means of H^T. The IIOs for the SASP and SPA subscales indicated that the order of the items was not invariant over the two latent scales, thus violating the assumption of IIO. The IIO for the subscale of SSSP was considered weak.

The reliability estimates of rho for the SPL and SPA subscales were good. The score reliability estimates for SPT were fair but surpassed the recommended value of 0.70. However, the rho estimates for SASP and SSSP were low.

The scalability results after an exploratory dimensionality analysis using the AISP is depicted in Table 13.

Table 13. Scalabilities after exploratory dimensionality analysis.

SPL			SPT			SASP			SPA			SSSP		
	Item	H_i		Item	H_i		Item	H_i		Item	H_i		Item	H_i
SC 1:	1	.515	SC 1:	6	.377	SC 1:	21	.486	SC 1:	11	.446	SC 1:	15	.432
H=.513	7	.528	*H*=.400	18	.396	*H*=.412	26	.342	*H*=.379	12	.399	*H*=.417	19	.375
	13	.508		29	.426		27	.324		23	.408		28	.437
	16	.571		32	.408		41	.468		30	.322			
	20	.580		37	.388		45	.450		33	.427	SC 2:	3	.319
	22	.541								34	.435	*H*=.336	4*	.314
	24	.516	SC 2:	8*	.544					35*	.308		14	.375
	38	.470	*H*=.535	39*	.546					43	.383			
	44	.566		50*	.513					49	.322			
	47	.370												
			SC 3:	2	.373				SC 2:	36	.366			
SC 2:	25*	.384	*H*=.373	40	.373				*H*=.366	42	.366			
H=.384	48*	.384												
			Item 9* non-scalable			Items 5,10 & 31 non-scalable			Item 17* non-scalable			Item 46 non-scalable		

Abbreviations: SPL, students' perceptions of learning; SPT, students' perceptions of teaching; SASP, students' academic self-perceptions; SPA, students' perceptions of the atmosphere; SSSP, students' social self-perceptions.
SC = Scale
* Indicates negatively stated items.

The entire DREEM inventory was exposed to an unprejudiced exploratory Mokken analysis to investigate whether the five predefined subscales could be retrieved and to determine how close they were to each other. The analysis generated $H < 0.3$, indicating multidimensionality. Using the AISP at a lower bound of c = 0.3 revealed six dimensions. A similar unprejudiced exploratory analysis was performed with 38 items (removing twelve problematic items) and the scale generated $H > 0.3$. Four dimensions were generated using the AISP, with a lower bound of 0.3.

The initial analysis indicated some challenging items, which called for an exploration of how problematic items would behave if they were excluded. Removing twelve of the most problematic items raised the scalability of $H > 0.3$ for all subscales and also increased the subscale score reliability surpassing the threshold of all subscales except SSSP.

STUDY IV – STUDENTS' EXPERIENCES OF THE ENVIRONMENT

This penultimate study sought to explore undergraduate chiropractic students' experiences of the meaning of their educational environment.

The analysis resulted in five overarching themes describing the students' experiences of the meaning of the educational environment: *personal growth; being part of a community; a place of meaningfulness; trust in a regulated system;* and *scaffolding relationships*. The reciprocal connections between the categories and their emerging and encompassing within-case themes are illustrated in Figure 5. In the depiction the categories in the center column emerged from the focus group interviews (regardless of class year or time point) and connected and underpinned the realms of preclinical and clinical education, organizational and communicative issues, and training to encourage independence and aspiration. In the early years, it was categorically about developing an identity and creating bonds; in later years, it was about managing workload and burden, the meaningfulness of clinical education, and becoming a professional. During both training points (longitudinal), the students stated that belonging to a chiropractic community was paramount for a sound educational environment. By belonging to a community with an established identity, the students were offered professional prosperity within a solid structural and functional organization with clear and anticipatory communication.

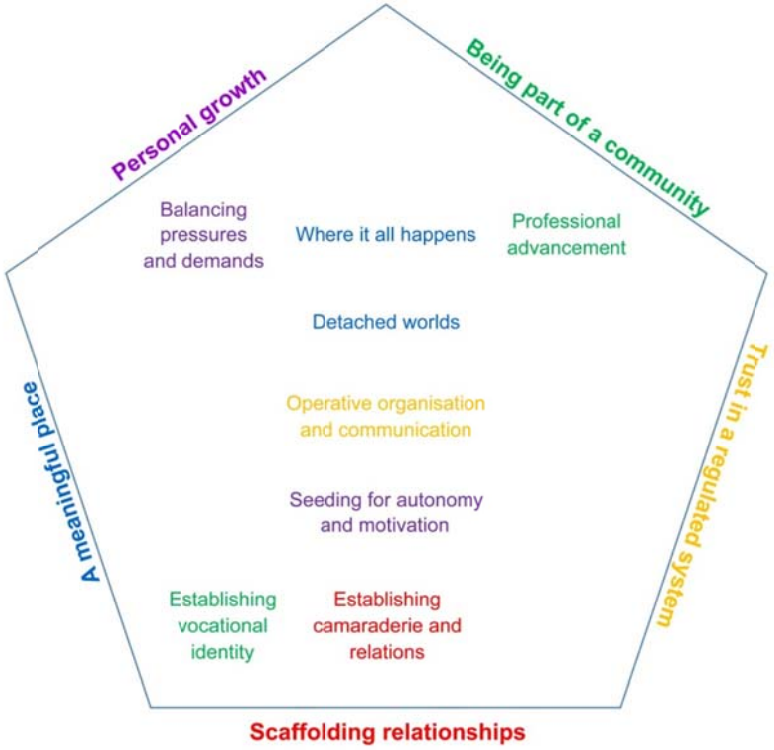

Figure 5. An illustration of the emerging five latent themes, with manifest categories arranged vertically (class year) and horizontally (time point).

Personal growth

The students experienced different types of stress, pressures, and demands. For moderate demands emanating from the institution and peers, the will to perform was bolstered. In pursuance of personal and professional growth, the students experienced demands as positive, motivating, and developmental as long as they did not transcend into negative pressure and stress, which were counter-productive. When students felt deprived or stressed, their support mechanisms were considered fundamental aspects of a good institutional environment. However, there was a lack of awareness of existing formal support systems during stressful periods. Motivation was experienced as the antipole of pressures and excessive demands, thus acting as their counterweight in a successful educational environment. Students' motivation to learn and study was significantly influenced by inspiring, well-prepared teachers who encouraged self-direction. However, this seeding for motivation and engagement was less marked during the clinical period than in the preclinical training period. The students experienced the environment as sufficiently preparing them for working life, i.e., being self-directed and taking responsibility and initiative. This level of autonomy became more apparent as the training advanced, but it was experienced as more stochastically than pedagogically induced. While motivation generated educational propulsion, stress was experienced as easily keeling this, and teachers' pedagogical skills were seen as fundamental in promoting personal growth.

Being part of a community

The students saw themselves as becoming part of a community to which they did not previously belong. A sound educational environment depended on assuming a chiropractic identity early on and knowing the profession. They considered prompt professional integration and the establishment of peer and mentor role models important in understanding, appreciating, and justifying their career path. However, they conveyed feelings of being distanced from other health professional trainings and that a nurturing environment that was sensitive to their future inter-professional role within the healthcare system was important. They considered vocation-specific learning and the relevance of subjects to the profession as important cornerstones of an all-encompassing educational environment. In order to evolve professionally and approach the chiropractic community, there was a sense of urgency to grasp "the tricks of the trade" and a propulsion to establish an apprenticeship model.

A place of meaningfulness

During the clinical training, both in the outpatient clinic and the internship, the students experienced closure. This environment facilitated their experience of communal cohesion, giving them the opportunity to evolve, learn, and gradually become part of the profession. It was where theory was translated into practice and where factual knowledge assumed purpose and meaning. The students stated that the internship and outpatient clinic enabled them to understand the importance of taking responsibility for their own development and of identifying knowledge-, skill- and behavior-related gaps. They experienced the outpatient clinic as a valuable, safeguarding training environment where learning conditions enabled them to work autonomously, albeit under supervision, and where they had access to professional expertise. However, the quality of the environment was inextricably linked to the

supervisor and the types and number of patients seen. The students felt that the program was characterized by a continuum from systematic teaching in the first years to less systematic teaching in later years. They perceived the formal and classroom-based courses as more systematic than the clinical and practical courses. The latter were seen as more fragmentary, happenstance, and disorganized, and classroom-based teachers were more prepared for their sessions. The students experienced a sense of two worlds, receiving two diverse types of training in two antipodal environments. There was a sense of a barrier between formal theoretical teaching inside the classroom and exogenously located clinical and practical teaching. The contrasting narratives of those students who were interviewed at two time points revealed a deteriorative shift in the environment from organized to disconnected.

Trust in a regulated system

The students anticipated that reliance on a regulated system would entail organized settings, clear expectations, and responsiveness to change. Forward planning for what was expected and required of them was experienced as important in creating an environment with a sense of trust, security, and understanding of the curricula. Sudden organizational changes generated confusion and irritation, and students found it difficult to plan their studies, private lives, and external activities. Communication shortfalls between the organization, students, and teachers induced anxiety and stress, creating rifts, engendering "them" and "us" conceptions and feelings of helplessness and organizational uncertainty. The students experienced the physical environment as creating a relaxed setting with a feeling of closeness and trust, providing opportunities to ask questions, discuss, and interact with teachers and peers. Maintaining and controlling the smallness of the institution were deemed important to promoting an environment for learning.

Scaffolding relationships

The students valued the amicable atmosphere and the small size of the institution, seeing them as conditions for bridging relationships. These attributes were seen as very positive characteristics, fundamental to their well-being and the general overall feel of the atmosphere. Despite some communication dilemmas, the institution was seen as enabling a comradely environment, providing for interactions between peers and faculty. They also considered it as providing a good social environment where everyone felt included and welcomed. Moreover, no one expressed discriminatory, bullying, or classist attitudes, neither from teachers nor from peers. The students encouraged one another to be part of the community to ensure that everyone was well and could keep up with the study pace. They considered that the training institution created a safe atmosphere, allowing strong social interactions, which engendered empathy and mutual trust and strengthened them as fellow humans, peers, and future professionals.

STUDY V – TEACHERS' EXPERIENCES AND CONCEPTUALIZATIONS OF THE ENVIRONMENT

In this concluding study the aim was to explore and contrast chiropractic and physiotherapy teachers' experiences and conceptualizations of the meaning of the educational environment.

Chiropractic teachers' experiences

Three themes emerged while exploring the chiropractic teachers' experiences of the meaning of the educational environment:

Motivating a vocational practice and modeling an ideal

The teachers experienced an environment in which theory was intentionally entwined with practice as a means of further motivating students' theoretical studies as well as reducing the perceived gap between theory and practice. There was intent to help produce and inspire an environment that alleviated the effects of the transition to clinical studies through a progression in the program by continuously increasing clinical exposure. By so doing, the teachers felt comfortable that students would have acquired sufficient vocational knowledge, skills, and attitudes pertinent to an ideal professional upon completing the program. There was a shared an understanding among the teachers that not everything could be learnt in undergraduate training and that an educational environment must support, enrich and inspire further professional vocational experience through real working life. The teachers tried to craft an educational environment that emphasized the core needs of a future chiropractic healthcare professional, one anchored in reality, in order to model ideal professional behavior. The teachers believed that to be an apropos chiropractic practitioner, factual knowledge was essential, that the emphasis of factual learning, particularly in the earlier years, was imperious, and that it was impossible to practice without that asserted knowledge. Teachers were nonetheless aware that real working life was seldom dichotomously black and white, that the training environment should emulate this.

Supporting and managing students in stress

The teachers of the chiropractic program were aware that students' study situation dispersed the educational environment. Students' constrained financial situation pushed them to take on part-time jobs, which, combined with their studies, was believed to result in stress. The teachers were determined about assuaging and decreasing students' stress levels but were sometimes inhibited by lack of tools, particularly as stressors were not always specific to schooling. The teachers also experienced that scheduling issues subsidized significantly to stress among the students, consequently undesirably impacting on the environment. Ill-timed and unexpected changes had been prevailing for a long time, and the organization seemed to struggle to solve this problem. The teachers stated that the smallness of the organization allowed rapid and facilitated ways for modifications and decisions; however, some did not experience the authority to do so.

Including students into the community of chiropractors

The teachers described how their profession had developed over the years and evolved outside the locus of government funded higher education institutions, therefore managing healthcare professional training and professional education rather independently. From the teachers' perspective, this had led to a rather competitive culture among chiropractors. The culture seemed to rub off on the educational environment among students as they were influenced by teachers who could behave in an authoritarian way by "doing their own thing" or having a "this is how to do it" approach. Though, some teachers seemed to have adopted a

more humble attitude and tried an all-encompassing strategy to incorporate students into the community of chiropractors. Despite being alienated from the traditional public university setting and responding with the occasional attitude of self-sufficiency, the chiropractors felt a sense of togetherness, of belonging to a community, managing on their own, to some degree, also independently of other more established healthcare professions.

Physiotherapy teachers' experiences

Three themes emerged while exploring the physiotherapist teachers' experiences of the meaning of the educational environment:

Putting the pedagogical vision into practice

The teachers held a strong and communal pedagogical vision about student learning. They desired to create an environment that enabled and facilitated student reasoning instead of only delivering answers to questions posed. The program had been designed for students to have a clear progression throughout and to learn from "real life" in the clinical setting. However, in the present environment of the program, they experienced challenges with putting the pedagogical vision into practice. The teachers expressed this as being due to the diversity among individual teachers, e.g., thinking and acting differently, and even though there was a communal pedagogical vision, there was an experience that some "older" peers taught according to tradition. Further, the program's complex logistics sometimes also made it difficult for teachers to reach their own high ambitions. In addition, the educational facilities were not always recognized as well-suited for their purposes due to co-sharing spaces with other institutional programs.

Balancing students' expectations

There was an experience that students held excessively high expectations of the educational environment, both in terms of them as teachers and the overall program. Teachers experienced students as being pampered and served on a silver platter. They also felt the urge to "entertain" the students. To a certain extent, the teachers met these expectations and tried to provide good and informative introductions, to repeat what they had already conveyed, and to coddle students so there would be no need to address problems later. The teachers also sometimes held themselves responsible for having cosseted the students and not succeeding in creating an environment that propelled students to take more responsibility. Their intention was also to equip students with a high level of self-esteem, inspire them to take responsibility, and facilitate their ability to grow into their future professional role. However, they experienced that students were sometimes spoiled; for instance, they did not show up for extra voluntary training when it was offered, even if they had themselves requested it, or they prioritized additional working over scholarly activities.

Providing prerequisites to grow within the profession

The teachers experienced that students anticipated becoming full-fledged healthcare professionals within the three-year program. Yet, the teachers viewed this as naive and argued that the students required real life experience and further education to fully develop into professional physiotherapists within healthcare. As such, the short program provided an environment within which to evolve. Also, the teachers found it problematic to understand

students' dismissal of factual overemphasis, or that their teaching exaggerated the importance of factual learning, as they viewed factual knowledge as a fundamental professional platform. The teachers intentionally did not try to teach students "everything" as this was experienced as impossible; instead, they tried to prepare them for a demanding professional working life. In their experience, the penny would eventually drop, and students' factual and theoretical knowledge would then prove useful.

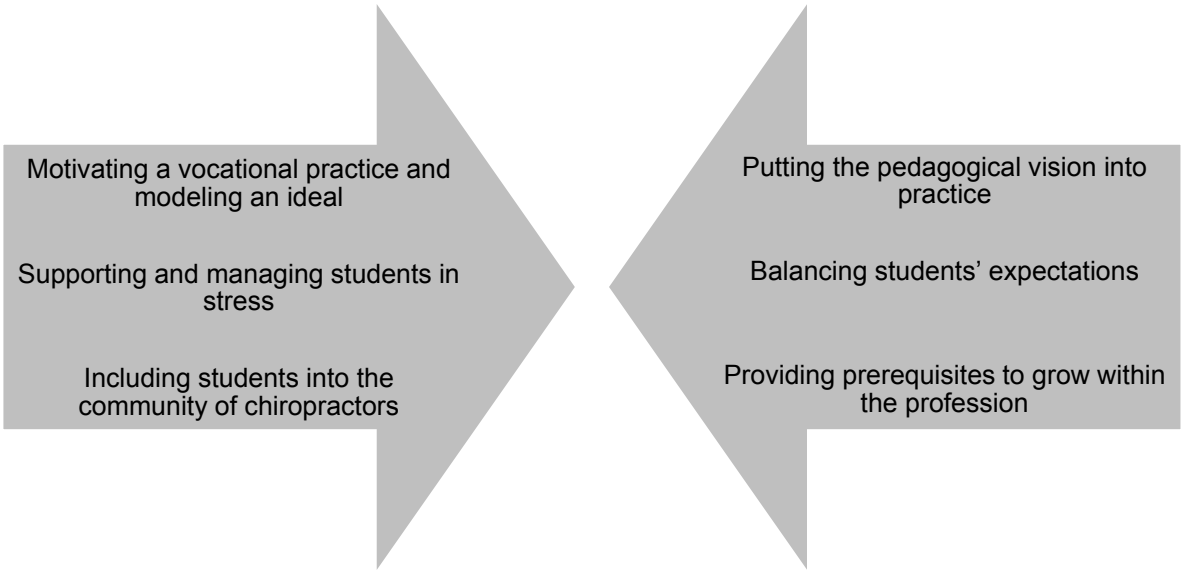

Figure 6. An illustration of teachers' experiences of the meaning of the two educational environments as the emerged themes contrasted.

When contrasting the two programs, as depicted in Figure 6, the chiropractic program was reinforced by motivating students for vocational practice and modeling an ideal for students, the physiotherapy teachers highlighted a strong pedagogical vision of how student learning could be facilitated, which needed to be put into practice. However, the chiropractic teachers strived to support and manage students who were stressed due to the high study tempo and financial pressure while the physiotherapy teachers wanted to balance students' program expectations, which was sometimes overwhelming. Finally, while the chiropractic teachers were eager to include students in the chiropractic community during the program, the physiotherapy teachers viewed the program as an introduction to the profession and the beginning of a professional voyage.

Teachers' conceptualizations

Five dimensions emerged, elucidating different aspects of what conceptually constitutes an educational environment. The *physical dimension* was a self-evident part of the educational environment, both inherently and connotatively. The *organizational dimension* included a working climate and atmosphere with an ability to discuss challenging issues with peers, coworkers, and the management structure. It also included the size of student cohorts. The *relational dimension* was regarded as a cornerstone for the construction of an educational environment in which teacher-student and peer relationships, both in student-student and teacher-teacher contexts were in the foreground. The *communicational dimension* – including

educational stakeholders' ability to communicate as well as the dialogic atmosphere in the organization and the handling of information toward students – was highly influential in the educational environment. Finally, the *pedagogical dimension* was viewed as an integral part of the educational environment. The role of students, the approach toward motivating learning, and how teachers went about their task as teachers were thought of as influencing the environment.

While all five dimension of the educational environment were to be found amongst both groups of teachers, these commonalities had different contents and implications (Table 14).

Table 14. The meaning of the educational environment as conceptualized by teachers

Dimension	Chiropractors	Physiotherapists
Physical	Physical spaces that are available and can work as a model	Physical spaces to support reflection and feedback
Organizational	Togetherness among teachers to provide a high quality education	Harmonious working climate and a shared responsibility for students
Relational	Relationships with students enables inclusion in the community	Relationships with students enable interactions for learning
Communicational	Close communication with familiar faces	Openness and transparency creates safety
Pedagogical	Give students responsibility through encouragement and support	Students' learning in the center with educational variation

OVERVIEW OF MAIN FINDINGS

Below depicts an illustration of the primary findings from the five empirical studies constituting the core of this thesis (Figure 7).

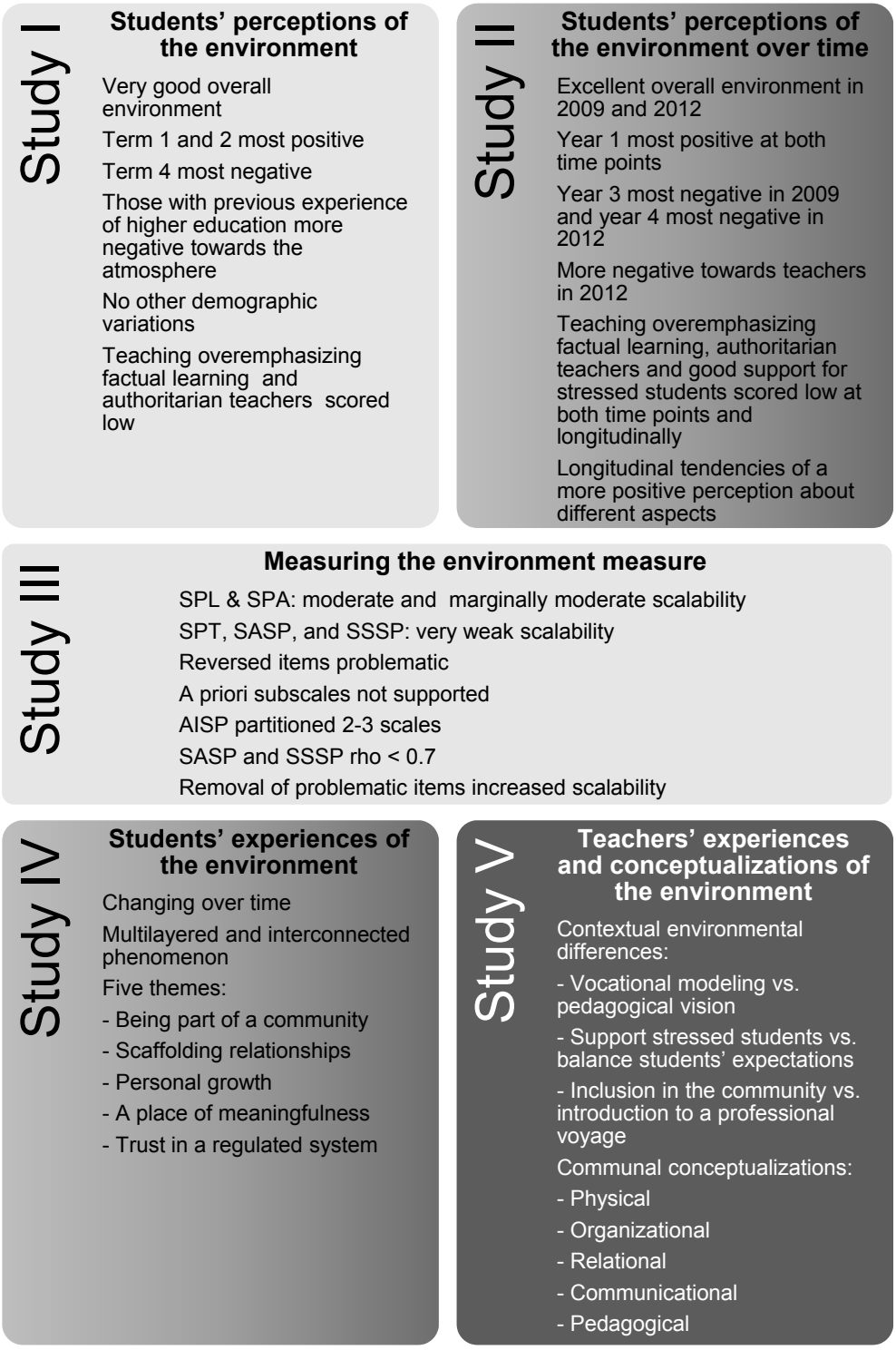

Figure 7. Overview of the main findings.

6 DISCUSSION

The current thesis set out on an inquiry of the environment in healthcare professional education and to deepen the understanding of the phenomenon of the educational environment. Specifically, it sought to explore what constitutes the phenomenon and what it means in the context of chiropractic and physiotherapy undergraduate education from the perspectives of students and teachers. This scholarly work embraced a pragmatic positioning: the idea of the thesis evolved predominantly from real-world settings and was postured within Dewey's entreaties – adopting a practical starting point and being melioristically motivated. The unfolding of the phenomenon under inquiry encompassed a mixed methods approach with a multi-lens focus, thus employing quantitative descriptive surveys using the DREEM, a psychometric investigation of the instrument, and in-depth qualitative explorations using focus groups and semi-structured individual interviews. The discussion in the subsequent sections is focused on the main findings and is organized into four layers, all intertwining with each other, where I invite the reader for a dance between two sides of the phenomenon under study. The first part attempts to abridge and delineate the phenomenon. The second part illuminates students' perspectives of the environment explored, moving from one way of reasoning to another. The third part endeavors to juxtapose teachers' and students' uniform as well as disparate perspectives while the last contrasts the two similar yet diametric environments.

DEMARCATION OF THE EDUCATIONAL ENVIRONMENT

The findings from the two-case inquiry align, to some extent, with some prevailing perspectives on the educational environment as a concept – i.e., as a context's aggregated physical, organizational, and social attributes, processes, and interactions (Grabinski 2005; Heimstra 1991; Jamaiah 2008; Moos 1973) – conjointly with the individual characteristics of its stakeholders and members (Armstrong & Yarbrough 1996; Wenger 1998). Further, this can be complemented with the notion of the pedagogical aspect, a constituent that has perhaps occasionally been taken for granted in the scaffolding and conceptualization of educational environments. Hence, this can be linked to floating and overlapping definitions, semantic interpretations, and connotative differences between educational and learning environments. Empirical evidence and theoretical perspectives suggest that although the concept of the educational environment is rather intangible and poorly understood, its properties are extensive, tangible, and persuasive. I argue that the educational environment as a phenomenon could benefit from being distinguished from other pivot terms such as learning environment, educational culture, learning culture, etc., and related contiguous phenomena such as the hidden curriculum. However, it should be recognized as interacting and overlapping with these dimensions while also taking on different meanings, depending on different preunderstandings, perspectives, and paradigms. Thus, there is a need to define the concept and its constituents. I therefore propose that the educational environment be demarcated as:

> *From the stance of an educational provider, an intricate physical-psycho-social entity, which is communally constructed by individuals, incorporating pedagogical and organizational aspects, with climate and culture describing subsets of the environment.*

The descriptive strength of a conceptualization of any phenomenon lies in its utilization (Teunissen 2015). Thus future research will have to ascertain the usefulness of this demarcation of the educational environment phenomenon and plausibly lead to further developments in the understanding of this phenomenon. There is of course the danger of a constrictive definition. However, many scholars are already constrained by how they define the educational environment, and I would argue that understanding another definition can help broaden the educational environment as a phenomenon.

STUDENTS' PERSPECTIVES OF THE ENVIRONMENT

The initial underpinning of this thesis was a rather deductive line of reasoning. The DREEM instrument employed in the first studies (*I, II* and *III*) was based on the assumption of a rather static concept of the educational environment – constrained within some predefined items, subscales, and deliberate conceptual ideas – identified by others (Roff. et al. 1997) and measured by means of students' perceptions. This conceptual model of the environment has been used in many diverse and culturally different settings, and in this thesis, it was tested in two new contexts (*Studies I* and *II*).

Despite some demographic variations when measured by means of the DREEM inventory, on a macro-level analysis, the students in the two case settings generally perceived that a sound educational environment was being fostered by their educational program. Cross-sectional, two time-point, and longitudinal data displayed no distressing, statistically significant changes regarding the overall or subscale scores. In accordance with other studies (Bouhaimed et al. 2009; Riquelme et al. 2009; Till 2004), *Studies I* and *II* corroborate the finding that the perception of the educational environment seems to be at its highest in the first and final years of an educational program, with a measurable downwards slope in the middle. Rotthoff et al. (2011) stated that it can be assumed that the perception of an accelerative deterioration of the educational environment is not due exclusively to educational delivery but also to individual factors such as aging, becoming more autonomous, and becoming more critical. Further, in line with situated cognition theories, learners must gradually recognize the impact that their personal actions have on shaping the environment, e.g., creating a safe rather than more stressful environment for other learners (Schumacher et al. 2013). However, young students' fervor in relation to higher educational studies or perhaps even enthusiasm for entering adult life diminishes over time. Empirical findings also posit that early enthusiasm appears to decrease for many students during the course of their studies, independent of any tangible negative experiences (Miles & Leinster 2007). Conversely, young students' happiness in relation to entering adult life and taking up higher education studies might explain the initial high scores in the studies. Likewise, it is plausible, based on the findings in *Studies I* and *II* that the higher scores designated in the later parts of the educational program could be arbitrated to having widened ones' perspectives but also due to a feeling of closure and a culmination of one's studies. Further, *Study I* revealed discrepancies in the environmental perceptions of the educational atmosphere, with students with prior experience of higher education exhibiting more negative perceptions compared to those students who had no prior experience. Studies have shown that students with prior higher education experience generally have a more negative attitude toward the environment than their counterparts (Miles & Leinster 2007; Till 2004). These students tend to be older and have more life experience. They may also have other obligations, such as work and

family, which make it difficult to socialize outside structured school hours. It appears paradoxical that students with a wider spectrum of educational experiences, and possibly more social networks and obligations, are less positive about the environment as they might not be as dependent on the environment as their peers.

Micro level issues

Edgren et al. (2010) have called attention to the DREEM-derived overall and subscale scores, contending that gauging perceptions of the educational environment may conceivably veil the presence of explicit educational problems. Particular attention must therefore be paid to interpreting the DREEM inventory on an item level, thus inquiring the educational environment on a micro level. The three items assiduously receiving deprived scores in both cases – cross-sectionally in *Study I* and comparatively and longitudinally on the basis of two time points in *Study II* – are discussed below.

Perceiving an overemphasis on factual learning

To the detriment of deeper learning, perceptions of factual overload have been shown to correspond with surface learning approaches (Kreber 2003), and there are many features of healthcare professional education that can drive students toward surface learning (Reid et al. 2005). It can be argued that younger students in the early stages of their educational journey view "factual learning" as "overemphasized," a notion supported in the findings from *Study I*. It can be further argued that this would subsequently diminish with the introduction of clinical hours. These tendencies were exhibited in the longitudinal sample among chiropractic students in *Study II*; however, there were no significant increases in the data to support this assumption. Factual learning is likely driven by the outline of formative and summative assessments. While factual learning it is not problematic as such, the learning of facts in isolation from the context in which the facts gain purpose and meaning has been repeatedly shown to be inferior. The differences between learning as reproducing facts and learning as meaning-making have also been extensively investigated (e.g., Albanese 2010; Newble & Entwistle 1986). Perceptions of overemphasizing factual learning were conspicuous in both *Studies I* and *II* and were significantly lower in the 2012 cohort in *Study II*. It has been asserted that many subjects associated with professional healthcare education that involve learning many facts (declarative knowledge) need to be conceptualized not as a set of facts but simply as one of numerous essential forms of knowledge in education (Whitehead 2013). Situated cognition assumes that learning is embedded in social, cultural, and physical contexts; when meaningful contexts are used to introduce concepts, content is then increasingly and more easily applied to new contexts (Brown et al. 1989). Meaningful learning occurs when incoming information can be linked to and interpreted by what the learner already knows in terms of what comes to have meaning for him/her. Thus, to recognize micro-environments where this can be accomplished is therefore indispensable. In reference to Mayer (2002), meaningful learning deals with knowledge construction by making sense of experiences in an active cognitive process. Research has shown that educational environments that cultivate authentic contexts facilitate meaning-making, stimulate the application of knowledge, and promote iterative reflection, thus guarding against both teacher-centeredness and the emphasis on factual learning (Edgren et al. 2010;

Henning et al. 2011; Veerapen & McAleer 2010). However, these problems are not insuperable, and addressing them may help alleviate the anxiety expressed by students.

Perceiving teachers as authoritarian

Contemporary education emphasizes student-centeredness, self-directedness, and lifelong learning, and teachers' roles have changed from being mere information providers to facilitators of knowledge acquisition and the attitudes and skills required for learning. Despite this, data from both cases, *Study I* and *II*, revealed that the students perceived the teachers as authoritarian. Further, in *Study I*, this item differed significantly between younger and older students. This perhaps suggests that teachers are more prone to teacher-centered attitudes and practices or that they have not found their rightful place as facilitators in an environment designed for student-centeredness. However, in a qualitative interview with students (data not reported in this thesis), the participants had difficulty explaining the connotation of the word "authoritarian," thereby making this item a possible instrumental artefact and, in turn, questioning its face validity. Cultural differences may also be at play in the connotation of the word, and contrary to previous claims by the DREEM developers (Roff. et al. 1997), the inventory might not be independent of culture, an opinion supported by others (Jakobsson et al. 2011; Vaughan et al. 2014a). However, the notion of authoritarianism, distinguished in *Studies I* and *II*, can form an accurate assessment of the students' perception. Legitimate peripheral participation, a notion within communities of practice (Wenger 2000), cannot function successfully in authoritarian, teacher- and syllabus-dominated environments. Teachers and students should work together. Teachers should model amongst each other the community and environment they wish to create for students and in their communities. They must be socially engaged, and as Renner (2009:74) puts it, they must see "through humanizing pedagogical practices" what poses problems for students.

Perceiving limited support when feeling stressed

Another finding, unveiled in *Study I* but more conspicuously so in *Study II*, was the level of dissatisfaction and attrition in the perception of support systems for stressed students. Edgren et al. (2010) have acknowledged that this item tends to score low and appears to be a communal problem in professional healthcare training. Dent and Harden (2005) have pointed out that professional healthcare education can be demanding and can exert diverse stressors. Such stressors have been shown to affect well-being and hamper academic performance (Madhyastha et al. 2014). An operative support system is indispensable in providing needed help for students during a likely stressful healthcare professional education. According to Moos and Trickett (1987), the system maintenance and system change dimensions in Moos framework of human environments, refer to orderliness, clarity, control, and responsiveness to change in the environment, thus easily accessible academic affairs counselling can contribute to an enhanced affirmative experience of the environment, which has also been suggested by others (Madhyastha et al. 2014; Mojaddidi et al. 2013). Moreover, mentoring can be decisive in providing emotional support, advice, and encouragement (Oelschlager et al. 2011). Kalen et al. (2012; 2015) showed that mentorship can provide psychosocial support and facilitate some aspects of students' professional competences, identity, and personal development. Possible further remedial actions include: increasing leisure time activities,

improving interactions between students and faculty, and providing peer counselling and advisory services.

The meso-level dimensionality problem

Based on indications from *Studies I* and *II* regarding the possible multicollinearity of the DREEM – due to noticeable discrepancies in internal consistency, together with merging psychometric empirical reports questioning the dimensionality of the inventory (Hammond et al. 2012; Jakobsson et al. 2011; Vaughan et al. 2014a) – the physiotherapy case setting was introspected more closely to investigate how the more general instrument worked in this specific context. Using item response theory, the data collected in *Study I* was tested in *Study III* to ascertain whether it fit a non-parametric IRT model and the capability of a set of items in terms of whether these items contribute toward a common aggregated measure for the ranking of individuals (Sijtsma & Molenaar 2002). In this thesis, I subscribe to the view that the DREEM inventory is a very useful tool for assessing environments in healthcare professional education, and its pervasive use, as outlined in Chapter 2, affirms the need for such an inventory. However, data from the physiotherapy student population in *Study III* could not support the putative five-subscale structure and the use of the DREEM subscales in the meso-level analysis of the educational environment. These findings appear to be congruent with other scholarly studies reporting that the construct validity of the DREEM is not adequately supported by empirical data (Hammond et al. 2012; Jakobsson et al. 2011; Vaughan et al. 2014a). According to the findings here, the SPL and SPA subscales revealed moderate and marginally moderate scalability, respectively, while the SPT, SASP, and SSSP subscales exhibited very weak scalability. These findings were further indirectly supported by the results in *Study I* in which Pearson's correlation between SPL and SPA were found to be high. Consequently, the psychometric findings in *Study III* imply that the inventory should be revised and adapted when applied to this or similar populations. Perhaps one likely reason for this is that certain items measure different constructs. However, it is also feasible that the items incorporated in the subscales are in fact adequate but that they might be too few, thus affecting the strength of the scalability (Straat et al. 2014).

Reversed items allocated to the subscales revealed problems, displaying low scalability and non-allocation in the exploratory AISP analysis. Reversed and negatively phrased items in inventories have been reported as problematic (Sonderen et al. 2013), although many developers of instruments adopt this strategy with the intention of circumventing response bias, particularly acquiescence. Furthermore, many of these reversed items seem to portray inferior teaching regimes. I thus concur with Jakobsson et al. (2011) who allocated many of these items to a new factor solution labeled "bad teaching," which perhaps better illustrates a non-constructivist approach to teaching and learning. Negatively worded survey items requiring reversed scoring may generate confusion in the interpretation of the results. Further, some of the DREEM items could be equivocally phrased; some items may not be relevant for students in the early stage of their educational program, who have little or no patient experience, or these items may not be pertinent to the Swedish context. It can be argued that the removal of certain items and the reformulation of negatively phrased statements (so that all items are unidirectional) could enhance the psychometric properties of the DREEM's putative model. Additionally, caution has been advised when calculating the DREEM overall sum score (Vaughan et al. 2014a). Exercising caution here might be worthy as findings from

Study III indicate that the DREEM items incorporated in the subscales display subpar dimensionality. However, the overall scores generated from a macro analysis of the DREEM can be beneficial for cross-cultural and contextual comparisons. However, it is highly conceivable, based on the findings from the scalability assessment and the exploratory AISP analysis in *Study III*, that there are more than five constructs being measured. Thus, the educational environment consists of more dimensions. Besides, one could argue that the educational environment, and by extension the hidden parts of the curriculum, rather than being a single measurable entity, is made up of many smaller parts, micro-environments, that are closely linked to those experiencing them.

Broadening of the phenomenon

As demonstrated, the deductive approach offered some potential limitations as certain constituents of the educational environment were not captured by employing and testing the DREEM in *Studies I, II*, and *III* and in their respective contexts. The empirical question posed was: what can we find out about the phenomenon when using a different approach to reasoning? Thus, to gain a more profound understanding of the phenomenon, an in-depth and full-scale qualitative exploration of the constituents of the educational environment was instigated. Consequently, in the latter studies (*IV* and *V*), and in part of *Study I*, a shift in the line of reasoning was made, and an inductive approach was assumed.

The open-ended question in the DREEM inventory has scarcely been reported in the literature. However, in *Study I*, this not only confirmed some key areas identified in the inventory – such as factual cramming with too much information to be digested over a very short space of time; teachers behaving in a controlling manner and becoming angry in class; stress caused by a very high study tempo; and a teacher-centered approach – but also captured new aspects such as deficiencies in the physical environment, lack of practical and clinical training, desire of fewer compulsory sessions and lectures, and more time allocated for independent study and reflection.

In *Study IV*, the chiropractic students' experiences of the meaning of the educational environment unveiled some elusive factors, all constituting facets contributing to a pertinent environment. The categories and themes revealed a multilayered, cohesive educational environment that changes over time. This differs from the macro-level analysis in *Study II*, where the two-time-point measurement revealed somewhat stable and equivalent overall scores of the educational environment. However, it is feasible that the DREEM instrument is not sensitive to detect subtle macro-level differences with regard to the overall score, yet, micro-level findings can be beneficial and illuminating.

The five themes in *Study IV* revealed that early in the training, the educational environment was experienced as *being part of a community* by establishing and understanding vocational identity and by *scaffolding relationships* through founding intra-institutional friendships and relations. In later stages of the training, the environment was more about endorsing one's *personal growth* – balancing academic pressures with professional progress and laying the foundation for autonomy and motivation. In the latter years, the clinical environment was experienced as where learning happens, thus creating *a place of meaningfulness*. Throughout the training, the formal and clinical environments were experienced as isolating, creating a

feeling of detachment between trainings, with little bridging between the two. An environment incorporating stakeholders' *trust in a regulated system* – an operative organization with clear communication channels regarding what to expect and with explicit rules and policies – was important for an apt education.

The themes from *Study IV* can be linked together and can be regarded as constituents of an educational environment. In what follows, they are discussed in terms of how they may support and relate to the phenomenon of the educational environment.

According to Moos' (1973) conceptual model, *personal growth*, or what he calls personal development or goal direction, constitutes one of the key elements of human environments, having been described as encompassing the basic directions along which personal development and self-enhancement tend to occur in a particular environment. It has been proposed that outcomes of personal growth comprise changes in goals and values, enhanced relationships, and improved productivity and creativity (Kern et al. 2001). Consequently, shaping educational environments that are apt for and integrate personal growth is essential in generating the necessary conditions for learning. A core tenet in the theory of communities of practice is the juncture between novices and experts and the route by which new members construct a professional identity (Li et al. 2009). Communities of practice encompass social arrangements in which individuals learn by sharing in activities, *being part of a community*, and inclusiveness enables an understanding of norms and values and the ways in which the community functions and dysfunctions. The development of a professional identity is something personal, and social processes are not disconnected from the acquisition of knowledge, skills, and behaviors (Manninen et al. 2013). Therefore, establishing pertinent environments that take communal belongingness into consideration is essential.

The findings further revealed barriers between preclinical and clinical training and that meaningful learning is experienced mostly during clinical training and internships – hence a *place of meaningfulness*. Wenger (1998) has asserted that our ability to experience the world and our engagement with it as meaningful is ultimately what learning should produce. Concurring with Shochet et al. (2013), in order to create environments that stimulate and embrace meaningfulness, the demolition of existing barriers could provide students with better learning opportunities that facilitate the development of knowledge that is relevant and meaningful, deep and retrievable, and amenable to alteration as part of an ongoing process. The theme *trust in a regulated system* emerged in experiences of organizational and communication problems with faculty, arousing perceptions of a boundary between "them," the training institution, and "us," the students. Alienation and student discontent are not uncommon (Bolkan & Goodboy 2013; Harrison 2007), and the higher education literature suggests that they are on the rise (Bolkan & Goodboy 2013; Cooper-Hind & Taylor 2012). Moreover, the students expressed some organizational problems such as scheduling issues, and addressing such matters may go some distance in assuaging the distress expressed by students. Establishing a realistic time schedule is essential as a means to addressing poor coordination, under-resourcing, and complicated scheduling, findings supported by several other research groups (Demiroren et al. 2008; Dunne et al. 2006; Jiffry et al. 2005). Thus, the notion of an all-embracing environment should incorporate a regulated system – in which students and teachers feel confident – as an important determinant of learning conditions.

The findings suggest that social integration and stakeholders' interaction are symptomatic of *scaffolding relationships* – which is pertinent for the educational environment – further corroborating empirical findings and notions from other scholars (Hoffman et al. 2002; Hutchinson 2003; Shochet et al. 2013). Wenger (1998) has proposed that while mutual engagement does not require sameness, it does create relationships among people. When it is sustained, it bonds participants in ways that can become deeper than the more elusive similarities consistent with personal features or social categories. Communities of practice can thus grow into a very tight node of interpersonal relationships. The communities of practice perspective on learning (Wenger 1998) – the act of becoming a member of a community of practice – foregrounds processes of relationship building, such as peer to peer and student to teacher.

Conclusively, based on the findings from *Studies I, II,* and *III*, I would argue that the deductive approach of testing the DREEM on the two case settings revealed overall strong and similar environments, interpretable by the guidelines provided and comparable to other global settings. The findings also identified specific elements of the environment that are particularly deficient. Despite some psychometric problems with the DREEM, there is a need for such an instrument. However, the phenomenon is more complex, and the inductive approach in *Study I* helped with the inquiry into the phenomenon and confirmed some measured aspects of the environment, including the scarce contextualization of factual knowledge and making it meaningful, stressed students and inadequate support, and student-centeredness and hierarchical ways of teaching. More importantly, however, it also revealed some new constituents of the environment that ought to be recognized, such as deficiencies in the physical environment, inadequate organization, and scarce pedagogical diversity and percipiency. The five themes derived from *Study IV* can be seen as assisting in a broadened understanding of the phenomenon. For the purpose of student welfare, there should be an endeavor to create, cultivate, and complement educational environments that inspire and guide novices toward becoming experts. Environments ought to involve and motivate students stepwise, with increased complexity, in the context of safe and meaningful places and in relationships with other members of the community, supporting them to become independent professionals.

TEACHERS' PERSPECTIVES OF THE ENVIRONMENT

While students' perspectives can be a good basis for scrutinizing, reforming, and improving the quality of the educational environment, the perceived and experienced environment among student cohorts is idiosyncratic and may differ significantly on a year-to-year basis. Thus, students' perspectives are only one side of the coin; the view of faculty is equally important. Consequently, continuing the line of inductive reasoning in *Study V*, teachers' perspectives were at the fore.

Shared conceptualizations

The findings in *Study V* revealed that teachers, both chiropractic and physiotherapist, had shared conceptualizations of the educational environment, expressed as five dimensions of the phenomenon.

The physical dimension was connotatively associated with the educational environment among the teachers in the two empirical cases settings. Researchers have underlined the prominence of the physical dimension of the educational environment and that formal learning spaces impact on learning outcomes and practices (Brooks 2011; Hutchinson 2003). Intuitively, we value the importance of this physical aspect of the environment although this dimension has been inadequately explored theoretically as well as empirically. Edgren et al. (2010) have also acknowledged that commonly used quantitative environmental measures of healthcare professional education fail to incorporate this aspect of the environment. In *Study I*, the students outlined some deficiencies in the physical environment, and those in *Study IV* experienced the physical environment as creating a relaxed setting with a feeling of closeness and trust, thus providing opportunities to ask questions, discuss, and interact with teachers and peers. Acknowledging the line of thought of the communities of practice perspective (Wenger 2000; Wenger et al. 2002) in designing physical community spaces—local neighborhoods—it is indispensable to arrange activities in both public and private spaces that exploit the power of individual relationships in enhancing events, using them to reinforce individual relationships.

The *organizational dimension* has much to do with where teachers work, which is an important attribute of the educational environment. Thus, it is imperative to pay attention to this dimension in which staff members enact their roles. Genn (2001b) has underlined that the organizational context – the working environment of teachers – is a strong determinant of that educational environment and is inextricably immersed in the environment perceived by students. The teachers experienced here that the organizational aspect of the environment was equally related to their own working environment as to the organizationally created environment for their students as educational consumers. Wenger (1998) has proposed that organizations should subsidize and foster social learning systems that are both internal and external to organizational boundaries. Therefore, if internal primacy is awarded to informal learning processes, emphasis is then placed on the meaningfulness of participation and the structures that facilitate informal aspects. However, learners also ought to be given external primacy to participate in broader learning systems in which they are only one amongst a multiplicity of players. In *Study IV*, students expected that reliance on a regulated system would entail organized settings, clear expectations, and responsiveness to change. Forward planning for what was expected and required of them was experienced as important in creating an environment with a sense of trust, security, and understanding of the curricula. Further, both groups of teachers, chiropractic and physiotherapy, conceived that the organization of small groups was pivotal for apt educational environments as this enables close exchanges between teachers and students. However, in *Study I*, the students raised the issue of the subpar organization and emphasized that classes were too big; those in *Study IV* valued the amicable atmosphere and the small size of the institution and saw it as a condition for bridging relationships. Regarding organizational aspects of the environment, it is plausible that faculty members might experience these differently from students and often underline explicit course planning while students emphasize content, sequence, and co-ordination, a notion supported by Muller et al. (2008). Moreover, it can be argued that while students are heterogeneous individuals, institutions' educational strategies and teaching methods are usually homogeneous. Notwithstanding, teachers are proximal members of the community,

with perhaps greater legitimacy and a higher mandate to influence the organizational aspect of the environment than students.

The *relational dimension*, portentous to educational stakeholders' intrinsic relationships, was in the foreground when the teachers in the two cases sought to conceptualize the educational environment phenomenon. Wenger (2010) has acknowledged that the communities of practice framework pertain to a broader conceptual framework for thinking about the social dimensions of learning. The communities of practice framework advocates interactions between the individual and the world and involves members in a set of relationships over time as it binds them together and helps facilitate trust (Jurchan 2014; Lave & Wenger 1991). On the basis of students' experiences in *Study IV*, social integration and student-teacher interaction were also considered pertinent to the educational environment. Isba (2015) has recently pointed out that the social and emotional aspects of the environment have much in common with the social networks formed by educational stakeholders. Scholarly work has further shown that contexts that support longitudinal relationships (e.g., among learners and teachers as well as other stakeholders, including patients) facilitate a sense of relatedness (Hirsh et al. 2007; Ogur & Hirsh 2009). Moreover, within Moos' (1973) framework of human environments, relations constitute one of the key elements and are distinguished by individuals' involvement in the environment, how they help each other, and whether there is free exchange of ideas.

The *communicational dimension*, which relates to the dialogic atmosphere, was experienced as pivotal among teachers in the two explored environments. Employing the communities of practice perspective, Lave and Wenger (1991) described the localized, interactive nature of knowledge in a community, asserting that a community thrives on such communication. It is believed that social presence affects the likelihood of an individual participating in a community (Tu 2002). The communicational dimension revealed a level of reciprocity with the findings of *Study IV's* exploration of students' experiences wherein communicational aspects, especially the incorporation of clear communication channels among stakeholders, emerged as key constituents of the environment. Nevertheless, academic stigmatization and the creation of "them," the faculty and educational setting, and "us," the students, were prevalent among the participants in *Studies I* and *IV*, similar to reports by other scholars (Dunne et al. 2006; Henning et al. 2011; Till 2004). Consequently, educational environments promoting clear, non-judgmental, and ample communication and rapid exchange of knowledge within the community are indispensable.

The *pedagogical dimension* is an often implicitly taken-for-granted component in explorations of the educational environment and the learning experience. However, it has been highlighted that in healthcare professional education, pedagogical issues assume a low priority, that content-specific teachers have little opening to discuss teaching and learning, and that educational values are subordinate to other requisites such as clinical practice and clinical and basic science research (Murakami et al. 2009; Seabrook 2003). Further, within healthcare professional education, the culture of individualism often results in teachers being confined and unaware of the practices of others. The explicitness of pedagogical aspects, i.e., the approach toward motivating learning and how teachers go about their task as teachers, an integral part of the educational environment in this study, was therefore somewhat reassuring. However, in *Study I*, students called for pedagogical diversity, with teachers using a greater

variety of teaching strategies. It was also experienced that teachers were not sensitive to the needs of individuals. The findings of *Study IV* portrayed pressure and demands and motivation and autonomy as counter poles and that teachers can mitigate pressure and demands by promoting autonomy, inspiring, and motivating as part of their pedagogical strategies. In light of communities of practice, there is common ground between the pedagogical aspect of the conceptualized environment and some of the effects of social practices, for example, time has to be allocated for a group to develop a communal repertoire; learning must emerge from students rather than be imposed by teachers; learning cannot be designed, it can only be designed for; and variation in levels of expertise and understanding can enlarge the group's learning (Wenger 1998). It has been underlined that if a community of practice is developed around teaching and learning, educational issues may become an enterprise, a goal of the community, which could enable teachers to integrate formal and informal knowledge in teaching and learning (Bolander Laksov 2007). In the context of a cohesive community of practice approach to teaching and learning, cultivating pedagogical environments that favor rich, authentic learning contexts over remote decontextualized knowledge and skill, student-centered, goal-directed inquiry over externally directed instruction, and supporting personal perspectives over canonical perspectives should be reflected when comprehensively crafting, investigating, and discoursing educational environments.

Interrupting a recursive cycle

In *Studies I* and *II*, students reported that teachers were authoritarian and that there was an overemphasis on factual learning. Teachers did, in part, acknowledge these aspects as challenges of their respective programs. However, they also rejected some of the students' claims, suggesting that students did not fully understand, for instance, professionals' need for factual knowledge and learning facts. Notwithstanding, a paradigmatic shift in education toward student-centeredness has occurred, and I would argue that many of these perceptions revealed by the students are possibly anchored in difficulties relating to the transformation of teachers' role from the "sage on the stage" to the "guide by the side." Further, this was supported in *Study II*, where students' perceptions of teachers were significantly higher, thus more positive, in 2009 compared to 2012, the period between the two time points when teachers were noticeably affected by the educational move towards a more student-centered and problem-based curriculum. However, conflicting experiences of the environment between students and teachers are not surprising as these stakeholders have entirely different perspectives and roles in the educational environment. Notwithstanding, Schumacher et al. (2013) have underlined in situated cognition theories that teachers and learners must attend to the reciprocal impact of constructing educational environments that are meaningful for learning.

Using an abductive line of reasoning based on the aforementioned findings, empirical evidence from other scholars, and existing theoretical frameworks, a model can illustrate and serve as a bifocal for the reciprocal connections between the micro-level issues of the educational environment and the negative perceptions acknowledged in *Studies I* and *II*. As depicted in Figure 8, a teacher-centered approach within student-centered curricula can promote teaching that emphasizes factual overload, thus resulting in a stressful environment for students This undesirable environment can be perpetuated through ineffective institutional

support and organization. The recursive cycle can be interrupted by creating a congenial environment wherein educational processes become an encouragement rather than a stressor for both students and teachers. This environment would also result in the establishment of adequate support systems for handling stress, extricate teachers from traditional teaching mind-sets, and construct student-centered environments wherein pedagogical processes promote meaningful factual learning that is contextualized and decisive.

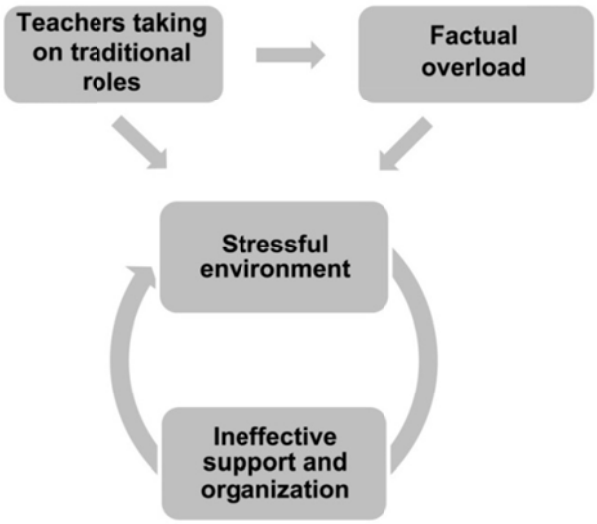

Figure 8. Depicting reciprocal connections between micro-level issues of the educational environment.

CONTRASTING THE TWO ENVIRONMENTS

This thesis engaged in an inquiry of two distinct educational environments. The chiropractic program is run by a small-scale educational provider outside the conventional state funded university system while the physiotherapy program is delivered within a large established state funded medical university. Due to their inherent educational cultures and differences, it was not possible to directly compare these two contexts; however, this was not the explicit intention or aim of the study. Nevertheless, contrasts could be done by investigating these contexts using a multiple case study methodological framework and using a variety of data sources to inform the educational environment phenomenon within two paralleled contexts.

As highlighted in this and the preceding chapter, the findings depicted many similarities between the two healthcare professional educational programs. By contrasting the findings from *Study I* with those of *Study II*, certain common trends can be deduced from a macro- and meso-level analysis, such as students perceiving a very positive or excellent overall, macro-level educational environment. They thus had an optimistic view of their learning situation, notwithstanding their perception that teachers are in need of more versatile pedagogical strategies. Students were seen as academically confident, with a good overall feeling about the educational atmosphere and their social situation. Similar findings have been reported in another Swedish context on a sample of medical students (Edgren et al. 2010). It is possible that this finding significantly mirrors students' perception of higher education environments in Sweden, regardless of whether these are organized within a state funded university system

or outside such a system and whether a program is delivered in chiropractic, physiotherapy, or medical undergraduate education. Further, as outlined earlier, two micro-level issues pertaining to the educational environment were perceived as subpar in both programs: teachers being authoritarian and teaching overemphasizing factual learning, both of which have stood out in many other studies, including in similar as well as more global and diverse contexts (Avalos et al. 2007; Demiroren et al. 2008; Edgren et al. 2010; Odole et al. 2014; Till 2004; Vaughan et al. 2014b). I would argue that this might reflect a more universal and wide-ranging problem in modern education. According to theories of situated cognition (Brown et al. 1989), communities of practice (Wenger 1998), and research by Simmons and colleagues (2000), modern educational environments – as conditions for learning – should build on three elements, i.e., that learning must be contextual, constructivist, and collaborative. However, the findings in this thesis as well as in the empirical literature reveal some challenges in embedding educational programs within such environments.

The contrasting experiences of the two groups of teachers in *Study V* revealed an emphasis on different aspects of the educational environments. The chiropractic teachers emphasized that their program was reinforced by motivating students for vocational practice and modeling an ideal for students while the physiotherapy teachers highlighted a strong pedagogical vision of how student learning could be facilitated, which needed to be put into practice. However, the chiropractic teachers endeavored to support and manage students who were stressed due to the financial pressure and high study tempo while the physiotherapy teachers wanted to balance students' program expectations, which was sometimes overwhelming. Finally, while the chiropractic teachers were eager to include students in the chiropractic community during the program, the physiotherapy teachers viewed the program as an introduction to the profession and the beginning of a professional journey.

Explicit contextual differences

There are many differences between the chiropractic and physiotherapy programs that might help explain and illuminate the findings of the studies, but there is also much discernable contextual dissimilarity. The chiropractic program, set within a small, privately funded educational institution, has a history of being an outsider; thus, being capable of managing on its own and developing independence from other university-based healthcare professional education programs can be seen as a living "saga." Burton (1972) coined the term "organizational sagas" in the beginning of the 1970s to refer to a shared understanding of unique achievements based on historical exploits of a formal organization, thus offering solid normative bonds inside and outside the organization. A saga often begins with the introduction of a strong vision by a small group with a mission whereby advocates give allegiance to the organization and take pride and establish an identity in relation to it. It has been asserted that a saga usually takes decades to develop and is more tangible and concrete in smaller organizations (Burton 1972). The allegory of an organizational saga can be used to depict the chiropractic program, a program built, over several decades, independently of the large publicly funded university tradition. In the findings from *Study V*, the chiropractic teachers experienced the program as having to rely exclusively on its own resources, thus developing a dandelion profession that managed on its own. They attributed the strength of the educational environment to the smallness and familiarity of the program, the pedagogical and organizational effectiveness due to its smallness, and an environment permitting high

quality vocationally directed training. However, in juxtaposing the item-level findings from the two programs (*Study I* and *Study II*), there was a preponderance of similarities as well as some discrepancies (these differences were not statically tested in this thesis). In the context of support during times of stress and in relation to time-tabling issues, lower mean scores in the chiropractic program compared to the physiotherapy program can be arbitrated as a consequence of educational under-resourcing. State funding can perhaps alleviate some of these issues by creating an educational environment that is more organizational, pedagogical, and finically robust. Moreover, the chiropractic teachers in *Study V* experienced that students' responsibility for funding their own education, and the consequent compulsion to graduate without delay, could provide an explanation for students' experience of the different types of stress highlighted in *Study IV*. However, it can also be argued that these pressures could have enhanced the students' intrinsic motivation to complete their program. Globally, there are rare examples of chiropractic education in publicly funded universities (Myburgh & Mouton 2008), and scholars have pointed out that the absence of a university-style tradition, coupled with a lack of access to government funding, has acted as a barrier to the development of the chiropractic profession (Murphy et al. 2008; Myburgh & Mouton 2008).

Conversely, the publicly funded physiotherapy program is part of a large-scale medical university. Häger-Ross and Sundelin (2007) have reported on the state of physiotherapy education in Sweden, highlighting its well-established and professional status within the healthcare professional education and service system. The near-inverse relationship when contrasting the gender distributions between the two programs was conspicuous, with 75% female physiotherapy students (*Study I*) and 30% and 45% female chiropractic students, respectively in 2009 and 2012 (*Study II*). This raises questions regarding contiguous phenomena, such as the chilly climate, in relationship to the educational environment. As the chilly climate has been studied in the chiropractic context (Palmgren et al. 2013), investigating the physiotherapy program and contrasting these two contexts would be tempting.

The findings from *Study I* yielded very high overall scores, and much higher overall scores compared to other international contexts in which the DREEM inventory has been utilized to gauge the environment in physiotherapy (Brown et al. 2011; Odole et al. 2014; Ousey et al. 2013). These high scores were also very similar to those of the chiropractic program, thus strengthening the notion of apt educational environments, irrespective of whether they are publicly or privately funded. However, as addressed above, contrasting the item-level findings from the first two studies illustrated many similarities as well as some incongruities. In relation to students being too exhausted to enjoy the program, lower mean scores in the physiotherapy program perhaps reflect that this program experienced problems with extrinsically motivating students. Likewise, the physiotherapy students displayed deprived scores (compared to the chiropractic students), as they felt less prepared for their profession, and that the teaching had helped them to develop their competence. These findings were further supported as a manifest theme – lack of practical training – in the DREEM inventory (*Study I*). One can thus argue that in relation to academic and scholarly endeavors, one can lose sight of practical and vocation-orientated features when educational programs are of a considerable size and focus on some issues that perhaps are, or perceived as, not practically related to the core vocational training.

It has previously been reported that the chiropractic program displays an excellent educational environment, as measured by DREEM (Palmgren & Chandratilake 2011). Further, the program has revealed an environment conducive to equality, though showing subtle but important gender-, ethnic-, and minority-related issues in the context of the chilly climate gauged by the PCCS-instrument (Palmgren et al. 2013). However, it is unfortunate that a comparison of physiotherapy students' cultural backgrounds was not possible in *Study I*. The fact that so few students were from ethnic minority groups is something that should be problematized in a society with inherently diverse cultural backgrounds.

In *Study V*, the physiotherapy teachers' experience was that students held overly high expectations of the educational environment, both in terms of them as teachers and the overall program. Physiotherapist students were experienced as being pampered and served on a silver platter, not showing up for extra voluntary training when it was offered, even if they had themselves requested it, or they prioritized additional working over scholarly activities. I would argue that in contrast to the chiropractic teachers, this was possibly reflected in the physiotherapist teachers' expression of a clear, top-down pedagogical vision, which was emphasized by the university. Consequently, in this large-scale organization, this vision of strong student-centeredness and resilient emphasis on problem-orientated teaching strategies and approaches to learning might have resulted in the need for students to be overly taken care of. The teachers thus felt like they were parenting students.

In *Study I*, the students raised the issue of the subpar organization and emphasized that classes were too big. Likewise, the physiotherapy teachers in *Study V* highlighted small group teaching as pivotal for apt educational environments, even if this was not always possible. The tendency for students to adopt a "surface" approach when involved in large group learning but a "deeper" approach in small group learning is well recognized (Dennick & Spencer 2011; Entwistle et al. 1992; Marton & Säljö 1976). However, I do not imply that this is the case in the physiotherapy program. Nevertheless, from an educational organizational perspective, this may be inevitable in the context of a large-scale educational provider, and educational stakeholders may experience this "crowdedness" as prevalent. For a small-scale educational provider and smaller organization, it might be easier to tackle and consolidate this.

Moreover, as the physiotherapy program is only three years long, this might reflect why teachers viewed the program only as the beginning of a professional journey in *Study V*. By contrast, the chiropractic program is significantly longer, though with much more restricted opportunities, with no embedded culture of specialization or tradition of advanced academic education (e.g., MSc or PhD degrees), after the preregistration training. For physiotherapy students, however, seven of the eight universities in Sweden offer master's and PhD level programs(Häger-Ross & Sundelin 2007).

Embedded cultural differences

Notwithstanding the above, the derived differences between the two programs might not be exhaustive in explaining all possible differences relating to contrasts between the two contexts. There might also be embedded cultural differences between the two professions, particularly regarding teaching and learning, a point highlighted between medical and nursing

students (Liljedahl et al. 2015). Professional cultures are of high influence in all organizations (Hall 2005), and from the perspective of communities of practice, while learning takes place through our engagement, it embeds this engagement in culture and history (Wenger 1998). The mutual norms, values, beliefs, and traditions of a group direct decision-making processes and produce behaviors that are rather different from those of other groups. Roxå et al. (2011) have reported that a culture can therefore often be regarded as a preserving force, which can act as a hindrance but can also preserve core values and practices. However, contrasting teachers' experiences of these two environments can be a first endeavor toward highlighting such cultural discrepancies.

Interestingly, while teachers from the two cases agreed on the dimensions conceptualizing the meaning of the educational environment, these held different connotations for chiropractic and physiotherapy teachers. This interpretation also aligns with the differences between the two programs discussed above. As these teachers are part of two different organizations, cultures, and communities, they have established different preferences regarding how they conceptualize the meaning of the educational environment. For example, the chiropractic teachers emphasized togetherness among teachers as an important feature of their educational environment whereas the physiotherapy teachers noted shared responsibility for students as crucial to their large-scale university environment where other responsibilities might gain precedence.

Arguably, the two groups had built their respective educational environments from different starting points, prerequisites, and goals, though within the parameters required for healthcare professionals. Bolander Laksov and colleagues (2015) have similarly reported that the environment for clinical learning is dominated by different dimensions and systems of environments among two different professional groups, though with some similarities. To sum, the two educational environments inquired in this thesis showed similarities as well as discrepancies, and understanding how the programs' structure and development shape the educational environment might simultaneously reveal their similarities and divergences and bridge cultural differences within these environments.

METHODOLOGICAL CONSIDERATIONS

By combining qualitative and quantitative studies, it was possible to construct a much deeper understanding of the educational environment in the two case settings. This can be venerated as a major strength of the thesis. I believe that the decision to employ a mixed methods approach, as opposed to a mono-method approach, could have hindered me as an investigator, perhaps being misled in terms of the findings of the studies, a notion supported by others (Creswell & Clark 2011; Johnson & Christensen 2012; Polit & Beck 2010). The qualitative work added elements, confirmed some constituents, and complemented an additional perspective that would have been overlooked had the work been entirely quantitative, e.g., an exploration of DREEM items. Conversely, the quantitative work offered the opportunity for a more direct comparison, analyzing larger datasets, and testing models. By rooting some elements of the qualitative work in the analysis of the initial quantitative data, it was possible to use one to drive the other.

A major weakness is that the DREEM was taken at face value. During the course of this thesis, it became obvious that it was not as psychometrically robust as previously reported. Whilst this ultimately led to additional findings and a suggestion concerning a further evolution of the scope of the DREEM, it might have been prudent to develop a novel measurement tool or to modify the DREEM inventory for the purposes of this work. Additionally, the DREEM was developed as a generic tool; as such, it may not have been able to pick up on some of the more subtle distinctions between environments in healthcare professional education. Further, because the DREEM is perhaps not completely appropriate for measuring clinical environments, such environments might be better investigated using more suitable instruments, such as the UCEEM or D-RECT, in order to unambiguously cover all aspects of the educational environment. A strength common to all five studies was the wide variation in participants, making it possible to capture different perceptions and experiences of the educational environment. However, in *Studies I* and *III*, students in term 6 were not included due to other scholarly obligations. Also, the longitudinal sample in *Study II* was quite small, making it difficult to draw conclusive results. It was nonetheless relevant to investigate the longitudinally derived data to explore students and their evolvement and adaption within the educational environment over time. The MSA utilized in *Study III* has been reported to detect unidimensional scales with rather small sample sizes; however, the literature recommends slightly larger samples than what was employed, which may have compromised the results (Straat et al. 2014). In *Studies IV* and *V*, purposeful sampling was used and drawn from two metropolitan educational settings in Sweden. A post-positivistic paradigmatic viewpoint could be that findings from such a sampling strategy might not be generalizable. However, based on my assumptions outlined in Chapter 4, I argue that findings from in-depth recollections of single and bounded cases can be transferred to other contexts and, in line with Flyvbjerg (2006) and Yin (2003), lead to the development of analytic generalizations. It can also be argued that the opportunistic sampling strategies employed in the five studies belong to the non-probability group of sampling techniques and can, depending on the paradigm, be regarded as a methodological weakness, though not necessarily from a pragmatist philosophical perspective.

Demographic variables such as gender, age, previous experience of higher education, and intent upon completing degree were tested in *Study I* only for the physiotherapist students, not the chiropractic students in *Study II*, which can be regarded as a drawback of the thesis. However, the aim of the thesis was to deepen understanding of the phenomenon of the educational environment, thus engaging in an inquiry into the phenomenon as a whole. Further, these characteristics and those of the chilly climate have been reported elsewhere in relation to chiropractic students (Palmgren & Chandratilake 2011; Palmgren et al. 2013). Conversely, another limitation was the inability to perform a demographic analysis of the perception of the educational environment in relation to the physiotherapy students' cultural backgrounds.

There is controversy regarding how Likert data should be analyzed, and the DREEM inventory has also been subjected to this discourse (Miles et al. 2012; Swift et al. 2013). The rationale behind the choice of a nonparametric analysis was grounded in the ordinal nature and non-Gaussian data distributions. Moreover, the use of means as a measure to present the central tendency might not be acceptable to some. There is further a debate about the validity

of taking a Likert response and treating it numerically (Carifio & Perla 2007; Norman 2010). However, the DREEM constructors intended for the item scores to be used and combined as numbers. Vaughan et al. (2014a) have advocated caution when calculating the overall sum score with an instrument that is unable to gauge a single underlying construct. Still, i) it is customary in educational environment research to report overall DREEM sum scores for cross-institutional comparisons; ii) there was an awareness of this in *Study I* and particularly in *Study II*, hence the emphasis on item-level analyses; and iii) until this issue has been further resolved and more comprehensively psychometrically explored, I would argue that it is important to report these findings from a macro analysis of the inventory. In *Study III*, it can be regarded as a weakness that a full exploratory psychometric investigation of violations of the underlying assumptions of the NIRT models was not executed. However, the intention of the study was of a pragmatic nature, and the MSA was employed by means of scalability and dimensionality as a first parsimonious step in exploring the DREEM from an IRT perspective.

Another weakness to be considered is that the voice of physiotherapy students was not echoed through comprehensive and in-depth qualitative investigations. However, in *Study I*, the open-ended question in the DREEM permitted students to express their thoughts in a less constrained way. Notwithstanding, using the terms derived from the dramaturgical model in Goffman's seminal work (1959), the data in *Study I* was only analyzed from a manifest rather than a latent angle – frontstage rather than backstage. In the context of qualitative explorations, there are also concerns as to whether it is conceivable for an investigator to persist with inductive explorations of a certain phenomenon over time while also acquiring greater understanding of the phenomenon. In line with Patton (2002), and posturing toward my pragmatist philosophical positioning and approach to inquiry, as well as how and in which order the data was collected, I would argue that I held a more abductive approach to the data in the latter studies and culmination of this thesis.

There was an effort in *Studies IV* and *V* to provide rich descriptions of the context and to relate the findings to the communities of practice theoretical framework and to Moos' conceptualization of human environments. Scholars have underlined the preeminence of providing rich and various contextual portrayals, and the aligning of theories, to enable transferability of results to similar settings where the reader can form part of the validating process (Larsson 2009; Savin-Baden & Howell Major 2013). The interpretation of the qualitative findings in *Studies IV* and *V* are subject to the limitations of all small-scale qualitative work. As qualitative research deals with detailed, in-depth analyses rather than large-scale population-based studies, it is not possible or desirable to generalize findings using traditional statistical inferences. However, the explicit description of the contextual setting, the participants, and analysis, together with the links drawn between the findings, theory, and the prevailing literature, may make it possible for the reader to appraise the applicability of the findings. As part of warranting trustworthiness in qualitative data-driven explorations, member checking can be used, i.e., a debriefing of the analytical results with participants for agreement (Creswell 2013; Lincoln & Guba 1985; Savin-Baden & Howell Major 2013). Member checking was not utilized here, and some methodologists have cautioned against its use (Morse et al. 2002). The rationale for this was three-fold: i) member checking rests on the assumption that there is a fixed truth or a reality that can be accounted

for; ii) it may be difficult for single participants to comprehend and see the bigger picture with data gathered from multiple participants; and iii) it requires great effort both timewise and logistically. Instead of member checking, data, methodological, and investigator triangulation, reflective note-taking as well as peer debriefing sessions in different phases of the research process were used to enhance trustworthiness (Savin-Baden & Howell Major 2013).

The methodological choices in this thesis are based on other investigators' empirical findings, overall aim, methods, and theoretical frameworks, which were intended to give the reader an understanding of the research process and the interpretation and presentation of the findings, thus contributing to a deeper understanding of environments in healthcare professional education.

7 CONCLUSIONS

This thesis engaged in an inquiry into the environment within the context of chiropractic and physiotherapy undergraduate education from the perspectives of both students and teachers. The overall aim was to provide a deeper understanding of the phenomenon of the educational environment in healthcare professional education.

In general, it can be concluded that the educational environment is not an all-encompassing, solitary, and static phenomenon but, rather, a more complex, less fixed, and measurable phenomenon than previously thought. It is a multilayered and multidimensional phenomenon in a relentless state of flux, a product of the contextual climate and culture.

More specifically, the conclusions drawn on the basis of the empirical findings and theoretical reasoning in this thesis are as follows:

- The educational environment can be demarcated as: From the stance of an educational provider, an intricate physical-psycho-social entity, which is communally constructed by individuals, incorporating pedagogical and organizational aspects, with climate and culture describing subsets of the environment.

- The phenomenon of the educational environment can be better understood in the context of a pivot term, i.e., by recognizing the component parts that make up the concept and how specific components – such as education, learning, environment – can take on different meanings among individuals and groups as well as within different cultures, traditions, and perspectives.

- Despite the fact that chiropractic and physiotherapy students are trained in very different educational settings and under very different conditions, they report very similar perceptions about their respective educational environments when measured using the DREEM inventory.

- The educational environment tends to be stable when measured over time, and subtle indications as more ameliorative perceived when measured longitudinally. The environment is perceived more optimistically in the first and final years of an educational program, with a measurable downward slope in the middle.

- Micro-level measures reveal communal subtleties of the educational environment among chiropractic and physiotherapy students, hence their perception of an overemphasis on factual learning, teachers as authoritarian, and limited support during stressful periods.

- The putative model on which the DREEM instrument is built cannot be conclusively supported and plausibly incorporates additional dimensions than were initially proposed. There are indications that the instrument is in dire need of item modifications, reviewed phraseology and syntax, and alterations to its response format.

- The experience of the educational environment changes over time. At the beginning of a program, students experience the environment as being part of a community and pertinent for scaffolding relationships. In later stages, the environment is more about endorsing their personal growth and creating a place of meaningfulness. Throughout a program, students' trust in a regulated system is seen as important for an apt educational environment.

- Teachers in chiropractic and physiotherapy, two groups of healthcare professional education, hold communal conceptualizations of the educational environment, expressed as physical, organizational, relational, communicational, and pedagogical dimensions.

IMPLICATIONS FOR PRACTICE

Although this thesis was undertaken in the context of chiropractic and physiotherapy curricula, the findings from these inquired contexts are congruent with existing empirical findings of healthcare professional education – including their scaffolding to prevailing theoretical concepts – and have thus strengthened the resolve that there are general practical implications and issues relating to higher education at large. There are four main implications for consideration:

Conceptually: it can be deduced that the educational environment is not an all-encompassing, solitary, and static phenomenon and may be much less fixed than previously thought. The data presented in this thesis suggests that the educational environment is a dynamic phenomenon in, to some extent, an unyielding state of flux. The educational environment could be thought of as a complex physical-psycho-social entity formed by people and constitutes both internal and external features on microscopic and macroscopic levels as well as existing in both formal and informal settings. It is predominantly a product of the contextual climate and culture. A greater awareness of conceptually framing the educational environment can be of importance when trying to delineate the phenomenon for investigative and scholarly purposes. Further, students may also play a much more active and dynamic role in the construction of the environment, and their interaction with it may shape how their personal micro-environment subsequently develops.

Instrumentally: because of the aforementioned constancy of change in the environment, it can be difficult to quantify it due to the nature of the phenomenon. The use of an instrument to assess perceptions of educational environments can be complex because there is the risk of excluding certain explicit elements. Questionnaire-driven data creates a snapshot but limited to provide information regarding the concerns underlying poor scores or other constructs that an instrument does not encompass. The findings suggest that despite the widespread use of the employed DREEM instrument and its purported global transferability, it may not be as sensitive in some populations as others and that some items should be revised, removed, or restructured to improve the psychometric properties of the instrument when used to assess other environments.

Institutionally: educational programs should formulate vision statements that resonate with the intended, prevailing, and optimal environments by drawing on educational stakeholders' perceptions, experiences, and conceptualizations. Institutions should further recognize that student cohorts can fluctuate, can be very diverse and idiosyncratic, and may differ widely on a year-to-year basis and during the course of an institutional program. Cultural discrepancies, variabilities in student characteristics, and diverse and changeable modes of teaching may require iterated scrutinization and fine-tuning of instruments if used to assess institutional environments. An educational institution requires a student-friendly environment where high-criterion academic support is effortlessly accessible for stressed students. Creating more accessible support systems for students, as well as for teachers, and being overly transparent and communicative about existing support systems may facilitate more apt environments, diminishing the number of students who fail courses, the attrition rate, and overly stressed members.

Pedagogically: the primacy of the pedagogical aspect of the environment is pivotal and subsidizes the backbone on which an effective educational curriculum resides. Cultivating educational environments that favor abundant authentic learning contexts, where students are at the center and individual perspectives are at the fore, should be considered when crafting apt educational environments. Thus, strategies to battle the overemphasis on factual knowledge and authoritarianism are indispensable. These features can otherwise contribute to a degrading environment and can perhaps be regarded as manifestations of teachers who teach by experience and tradition rather than being directed by educational research and principles. Consequently, there should be further pedagogical and organizational faculty development that extends beyond lecturing and teaching and where educational environments are more comprehensively decoded and illuminated.

FUTURE PERSPECTIVES

Many new questions have emerged during the course of this thesis, and some of the data requires further investigation. Five major strands for impending empirical research could be drawn from this piece of scholarly work and used to guide and scaffold future perspectives.

From this work, one acknowledges that the environment is evidently and most powerfully embedded in healthcare professional education and that the perceptions and conceptualizations of it, as well as the experiences it exerts on its stakeholders, are widespread and persuasive; the concept is somewhat ethereal. Notwithstanding, a potential demarcation of the educational environment is put forward on the basis of the findings of the thesis as an attempt to contribute to the discourse. However, this is a first parsimonious step toward a communal and consensual definition of the educational environment, and there is much to be explored. Additionally, a common consented usage of the pivot terms involved – education, environment, learning, climate, and culture – could contribute to a greater understanding and mutuality of the language game that phenomenon is exposed to. However, I would argue that continued research on educational environments that seeks to illuminate the concept and to contribute with a better understanding of the phenomenon requires both qualitative and quantitative methodologies and an exploration of all-encompassing stakeholder groups involved in constructing, affecting, and influencing the phenomenon.

The second strand arises from the findings, together with emerging empirical psychometric evidence from a multitude of heterogeneous contexts that may cast doubt on the psychometric properties of the employed inventory. The DREEM is still the most widely used instrument for assessing the undergraduate professional healthcare educational environment. Despite the fact that in this thesis the temperature – climate – was taken in two different educational environments, it may be time to recalibrate our thermometer. Consequently, further empirical work should be performed to address issues of dimensionality regarding its subscales to develop a sound version as there seems to be a need for one. Individual items should further be explored psychometrically and by means of a qualitative methodology with regard to item construction, response format, response directionality, syntax, and phraseology. Because the DREEM was developed about 15 years ago, the moment may be opportune to revise items therein and possibly incorporate new characteristics, such as perceptions of physical and technological aspects of the educational environment. Further, there is a need to modify and enhance already existing items contributing to the environmental measure, such as the pedagogical, organizational, relational, and communicational aspects, which may be outdated, ambiguously or insufficiently addressed, and culturally biased. Moreover, a logical secondary step of our material would be to employ the data to a parametric IRT model or to combine the strength of the IRT psychometric framework with the more established CTT framework.

The third strand would involve further work on the relationship between the educational environment and curricular outcomes. There are significant ways in which an environment (and by extension, the informal and hidden parts of the curriculum) can impact its educational stakeholders. By looking at outcomes such as exam performance, career choice, or attrition rates, it may be possible to quantify this impact and then harness the instrument as a curriculum development tool. Further, qualitatively exploring students' and teachers' thoughts of this relationship could further inform the impact of environments in healthcare professional education. The work presented in this thesis goes part of the way to a better understanding of what an educational environment is and what makes a "good" environment. By exploring this further in the future, it might ultimately be possible to alter the environment in order to improve not only students' learning experiences and teachers' experiences of the working environment but also curricular outcomes.

The penultimate strand could elaborate on the findings from the qualitative empirical investigations in this thesis and contribute to the line of thought. Future studies could explore the emerged themes to find traits of commonality in other healthcare professional environments and to expand on the conceptualizations derived from the educational environment. Individual perspectives of the environment, with regard to their relationship with institutions' educational and curricular goals, might in future be explored as this could elicit alternative perspectives. Further, employing group interviews consisting of both teachers and students and possibly other stakeholders, such as educational and institutional leaders, may deepen the insight into the creation of apt, functional, and homogenous environments. This would fit well with other recent work in the area of workplace-based learning (Dornan et al. 2007; Liljedahl et al. 2015; Stok-Koch et al. 2007) in undergraduate and postgraduate healthcare professional education. Finally, engaging anthropological inspired studies with ethnographic approaches, through qualitative observations, could be

valuable in further exploring and understanding the cultural aspects of the educational environment. Thus, investigating members' deeply shared values, beliefs and/or ideologies of the phenomenon and expanding the understanding of the "metrological zone" the educational stakeholders resides in.

The fifth strand arises from the use of Moos' (1973) theory of human environments as a framework, as proposed by Schönrock-Adema et al. (2012), to understand our findings. This was also used during parts of the analytical process. Some of the findings align well with this conceptual model, but further empirical investigations are needed and would probably best be accomplished using multiple methods and different research paradigms.

8 EPILOGUE

My background is that of a dancer, and in many ways, this journey as a PhD student and learning about research has been analogous to that of becoming a ballroom dancer. First, you must learn the basic steps and movements of the dance; then you learn how to put all the steps and movements together in a logical order and esthetical manner. As you evolve as a dancer, you become freer and more confident in your movements, but you must remain loyal to the character of the dance and obey its explicit and implicit rules. You then spend years practicing and rehearsing, modifying and refining, enacting and reflecting on your technique, skills, and expressions. Finally, this culminates in a dance competition and a performance where you battle with peers and are being scrutinized and assessed by a panel of adjudicators.

This thesis has endeavored to take the reader through a dance to encounter the phenomenon of the educational environment, with the aim of a deeper understanding of this phenomenon.

The dance metaphor "It takes two to tango" used in the title of this thesis can be symbolized as the tension, as well as the mutuality, between different aspects of the phenomenon of the educational environment and how the phenomenon was inquired. The tango has quantitative features such as a predetermined number of steps, tempo, and for the dance, characteristic sequences of figures. At the same time, there are qualitative features of the dance figures that need to be interpreted through the feelings and lived experiences of the dancer. This occurs deductively from a top-down perspective, by testing different steps and figures, as well as from a bottom-up perspective by experiencing new movements through dialog with your dance partner and observations of other dancers. In the tango duo you have a leader and a follower, the leader guides the follower though the established choreography, but their roles are different yet reciprocal. The tango can be learned in different contexts and taught by different people, such as by the experienced tango aficionados in the cafes and on the streets of Bueno Aires or by qualified dance teachers in renowned dance schools in London's ballrooms.

Reflecting on my time as a dancer, it has become clear to me that all my dance teachers, lessons, and competitions have had an impact on my education as a dancer. But what probably most formed me and made me a dancer was actually being situated in the communal environment of dancing and its inherent climate and culture.

This environment is indeed like a mist; you cannot stay long in the mist before becoming thoroughly soaked.

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